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CALIFORNIA FISH AND GAME

"CONSERVATION OF WILD LIFE THROUGH EDUCATION"

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Volume 3

San Francisco, January, 1917

Number 1



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IN MEMORIAM.

Alonzo F. Lea, a deputy of the Fish and Game Commission for many years, died in Santa Rosa on October 26, 1916. A week previous he fell from a step-ladder while repairing an awning at his home in Cloverdale and fractured his skull. At the time it was realized that he was dangerously hurt and as soon as possible he was taken to the hospital at Santa Rosa, where the best of medical skill was available. During the few days that he lingered, he never fully regained consciousness, and died without recognizing those closest to him.

Lea's work for game conservation began during the nineties. In the early days he was detailed to various parts of the state, but his best work was accomplished in Sonoma, Lake and Mendocino counties. His familiarity with the roads and trails, his fearlessness, his extensive acquaintance in all parts of these counties made him a particularly valuable man. The fact that the counties in which he worked are well supplied with game today is largely due to his conscientious work.

He was buried at Kelseyville, Lake County. Notwithstanding the comparative inaccessibility of this town, hundreds of friends came from distant places and many of the public officials of Lake County were present at the funeral. He was borne to his last earthly resting place by associates in the employ of the Fish and Game Commission.

It is difficult to express in words the sentiment that fills us at the burial of a loved and respected friend. The tribute paid him at the grave by his former chief, Charles A. Vogelsang, was fitting and most appropriate. It was as follows:

"We, his former associates and comrades, have come here today to pay our last tribute of respect and affection for one who was our friend, a true soldier in the ranks. His work was characterized by courage, loyalty and integrity. He rendered a great service to the nation and the state. In the performance of his difficult duty he made no enemies, only new friends.

"Of him it can be truly said, 'his life was gentle and the elements so mixed in him that nature might stand up and say to all the world, he was a man.'"

—J. S. H.



EASTERN BROOK TROUT (*Salvelinus fontinalis*)
—From drawing by Charles Bradford Hudson



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Volume 3

SAN FRANCISCO, JANUARY 20, 1917

Number 1

HISTORY OF THE INTRODUCTION OF FOOD AND GAME FISHES INTO THE WATERS OF CALIFORNIA.*

By W. H. SHEBLEY, in charge Fish Culture, California Fish and Game Commission.

The California Fish Commission during the first decade of its existence introduced into the waters of this state a number of varieties of food and game fishes and the attending results are regarded as being among the greatest achievements in fish-culture and acclimatization. The only work of the kind that will bear favorable comparison is the introduction of food and game fishes into New Zealand. The success of the work was due largely to the untiring efforts of Dr. Livingston Stone, a fish-culturist of that day, in the employ of the New York Fish Commission; and to the study and the practical work of Mr. J. G. Woodbury, who later became Superintendent of Hatcheries for the California Fish Commission.

The most important work in the introduction of new fishes into the state was accomplished during the period from 1870 to 1883; following this came the preservation of the fishes, and the artificial propagation of the native species on a large scale, to multiply their numbers to meet the demands of commerce and of an increasing population.

Since its initial organization in 1870, the Fish and Game Commission has introduced into the waters of California about thirty new varieties of fish, with varying degrees of success. Following is an account of the species introduced, the dates of introduction, and the results obtained:

1. In 1871, the State Fish Commission secured the services of Mr. Seth Green, the noted fish-culturist, to superintend the transportation of a consignment of shad fry across the continent from New York to California. Mr. Green and an assistant left Albany, New York, on June 19, 1871, with 12,000 young shad fry (*Clupea sapidissima*) and arrived at Sacramento on June 26th. The same day the fish were planted in the Sacramento River, at Tehama. About 10,000 of the fry were in good condition at the time the plant was made. Early in June, 1873, a second shipment of shad was made by Dr. Livingston Stone. The trip across the continent was a joint affair planned by the

[*No state in the Union has been more successful than California in establishing new food and game fishes, but there are comparatively few of our citizens who know the names or the history of the many introductions. It is fortunate that sufficient records have been kept to make possible this outline of the different attempts to introduce desirable species. The present article is an extract from one which appeared in the "California Blue Book" for 1911, pages 513-527. Although some of the scientific names used are obsolete, yet the name used at the time of introduction has been retained without change.—EDITOR.]

federal and the California commissions, and for the first time a car was used especially equipped for the work of transporting the fish. This aquarium car was the property of the United States Fish Commission; it was fitted with tanks for sea and fresh water, ice chests, apparatus for aerating the water, supplies for the attendants, sleeping accommodations, etc. The car carried nearly 300,000 valuable food and game fishes, consisting of ten species. Unfortunately, owing to the collapse of a railroad bridge over the Elkhorn River, in Nebraska, the car was destroyed and the whole consignment was lost. However, this accident did not deter the California Commission from carrying out its purpose of getting a second lot of shad into California. Dr. Stone was instructed to return East and secure another shipment. Accordingly, on the 25th of June, he left Castleton hatchery, in New York, with a third shipment of shad fry and July 2, 1873, 35,000 were planted in the Sacramento River, near Tehama. The expense of this shipment was paid by the United States Commission. Several other shipments were made by the United States Commission between 1876 and 1880. All the shad fry, totaling 619,000, were planted in the Sacramento River, near Tehama. In 1873, two years after the first shad were deposited in the Sacramento River, several mature specimens were taken in San Francisco Bay. The species has continued to increase until it is now one of the most common fish in our waters.

2. The German carp (*Cyprinus carpio*) was first imported into California in 1872, by Mr. J. A. Poppe of Sonoma County. He brought five fish from Holstein, Germany, and put them into his private ponds, where he held them and did a thriving business for a number of years, selling their progeny for purposes of propagation. In 1877, the California Commission exchanged trout eggs with the Japanese Government for 88 young carp, and in 1879, the Federal Commission shipped 298 carp to California; 60 of these were planted in Sutterville Lake, near Sacramento, the remainder in a private pond in Alameda County, where they were at the disposal of the State Commission. During the same year, J. V. Shebley, a fish-culturist and private pond owner in Nevada County, began the propagation of carp; and in 1883, he sold to the California Commission 600 German carp, which were deposited in the Sacramento River, near the city of Sacramento. In 1882, the United States Commission began to deliver carp to private applicants; and in a short time carp were to be found in nearly all public and private waters of the state, in which they would thrive. At the time these plants were made the carp was one of the most popular of fishes; they were recommended as being valuable food fish that would thrive in all of the warmer lakes, ponds, and streams of California. Much has been said for and a great deal more against the introduction of carp into California; but while they probably have been the principal cause of destruction of the California perch, by eating the eggs and digging up the nests, at the same time they furnish the chief food of the black and the striped bass, two varieties of fish whose value more than offsets the damage done by the carp. In time, as other species become more scarce, the carp will probably become one of the state's most valuable food fishes, as it already is in older states and countries.

3. The eastern brook or speckled trout (*Salvelinus fontinalis*) was first introduced into California in 1872. The state purchased 6,000

fish and distributed them equally in the North Fork of the American River, the headwaters of Alameda Creek, and in the San Andreas Reservoir, near San Francisco. The first shipment of eggs (60,000) that produced results was purchased by the California Commission in New Hampshire, in 1875, and hatched at Berkeley. The fry from this lot were distributed principally in lakes and streams in Mendocino, Sonoma, Napa, Yolo, Alameda, and Santa Clara counties, and in Prosser Creek, Nevada County, and the North Fork of the American River, in Placer County. In 1877, 1878, and 1879, eggs were obtained from New Hampshire and Wisconsin, and the resulting fry were distributed over a large area of the state's waters, the North Fork of the American River and the Truckee River receiving the largest plants. The fish planted in the coast streams did not reproduce, but those planted in Siskiyou, Placer, and Nevada counties, and in the high Sierra lakes and streams multiplied remarkably well. In 1890, the work of propagating the eastern brook trout was taken up in earnest and each year the Commission distributes thousands of these trout in nearly every county having suitable waters; they are now one of our most sought after fish.

4. Between 1872 and 1883 the national commission furnished the state commission with six consignments of whitefish (*Coregonus clupeiformis*), aggregating nearly 1,500,000 eggs. The eggs were hatched at Berkeley, at San Leandro, and in a temporary structure erected on Clear Lake, in Lake County, and the fry were distributed in some of the larger lakes and streams of the state that seemed best adapted to the habits of the fish; but they did not thrive. The western or Rocky Mountain whitefish (*Coregonus williamsoni*) found in the Tahoe basin has been often mistaken for the imported species.

5. In 1874, at the request of the California Commission, a second attempt was successfully carried out to bring the common eel (*Anguilla chrisypa*) to California, the first attempt having ended with the disaster to the aquarium car. Of the original shipment, consisting of several thousand small individuals, the loss in transit of the fresh water eel taken from the Hudson River, New York, was almost complete; but twelve survived, and these were placed in a slough of the Sacramento River, near Sacramento; but the salt water eels from New York Harbor stood the journey better, and about 1,500 were deposited in San Francisco Bay, near Oakland. In 1879, Dr. Stone brought out a second shipment of about 500 small eels; these were planted in the Sacramento River. In 1882, Mr. J. G. Woodbury of the California commission transported ten adult eels from the Shrewsbury River, New Jersey, and deposited them in Suisun Bay. There have been no apparent results from any of these plants.

6. The American or eastern lobster (*Homarus americanus*) was first introduced into California waters in 1874, a consignment made the previous year having been lost when the aquarium car was destroyed. Under the auspices of the California commission, Dr. Stone started with 150 full-grown, egg-bearing females from Massachusetts Bay; but four of them reached the coast alive, and these were planted in San Francisco Bay, near Oakland. Subsequently four other small shipments were made, the last in 1888. Plants were made in San Francisco Bay, off Bonito lighthouse, off Point Lobos, to the south of

Carmel Bay, and in Monterey Bay; but although several of those planted in Monterey Bay have been taken by fishermen, no resulting increase in numbers has attended any of the plants made. Thus far the reason for the failure of the lobster to multiply in these waters is not definitely known, as the physical and biological character of the waters of the Pacific Ocean is apparently suitable for its acclimatization.

7. In 1874, several species of catfish were introduced—the common bullhead or horned pout (*Ameiurus nebulosus*), the channel or spotted cat (*Ictalurus punctatus*), the white or Schuylkill cat (*Ameiurus catus*), and one or more species from the Mississippi Valley. On June 12th, fifty-four large Schuylkill catfish from the Raritan River, New Jersey, and the Mississippi catfish, were planted in the San Joaquin River, near Stockton; while seventy bullheads from Lake Champlain, Vermont, were deposited in ponds or sloughs near Sacramento. The Schuylkill cat of the Sacramento River increased very rapidly and soon was as commonly seen in the markets as our native fish.

8. An attempt was made to acclimatize the Atlantic salmon (*Salmo salar*) in 1874, when 305 of the 450 fish brought by Dr. Stone from the Penobscot River, Maine, were planted in the Sacramento River, near Redding. No results were obtained from this plant, as the number of fish planted was not great enough to determine whether they would or would not become acclimated to the waters of the Sacramento. The United States Commission hatched out 200,000 eggs at Fort Gaston, California, in 1890, and in May, 1891, 194,000 fish were liberated in Trinity River; but no run was established.

9. The black basses, both species (*Micropterus salmoides*) the large-mouth and (*Micropterus dolomieu*) the small mouth, have been introduced into California, and have thrived remarkably well. The first shipment, brought out by Dr. Stone in 1874, consisted of seventy-five full-grown spawning bass from Lake Champlain, Vermont, and twenty-four small fish from Saint Joseph River, Michigan, both shipments being of the small-mouth variety; the former were planted in Napa Creek, the latter (twelve survivors), in Alameda Creek. A second shipment of twenty-two mature fish was brought out by Dr. Stone in 1879, and planted in Crystal Springs Reservoir, in San Mateo County, where they increased rapidly; hundreds of the progeny were consigned to various waters in the state. The United States Commission, in 1891, deposited nearly 2,000 yearling large-mouth bass in Lake Cuyamaca, in San Diego County, and 620 in the Feather River, near Gridley. In June, 1895, at the request of the California Fish Commission, the United States Commission delivered 2,500 large-mouth bass fry to the agents of the state commission. These fry were placed in the ponds at the Sisson hatchery, where they thrived, and whence the species was distributed throughout the state, wherever suitable waters were to be found. In the same month, fifty fish were put in each of the following California waters: Buena Vista Lake, near Bakersfield; reservoir near San Diego; and Elsinore Lake, near Elsinore. Agents of the Fish Commission distribute a large number of bass each season from the overflowed districts, where they are seined and deposited in public waters. Both species of the bass are highly esteemed as food and game fishes, and are a great acquisition to the fish life of California.

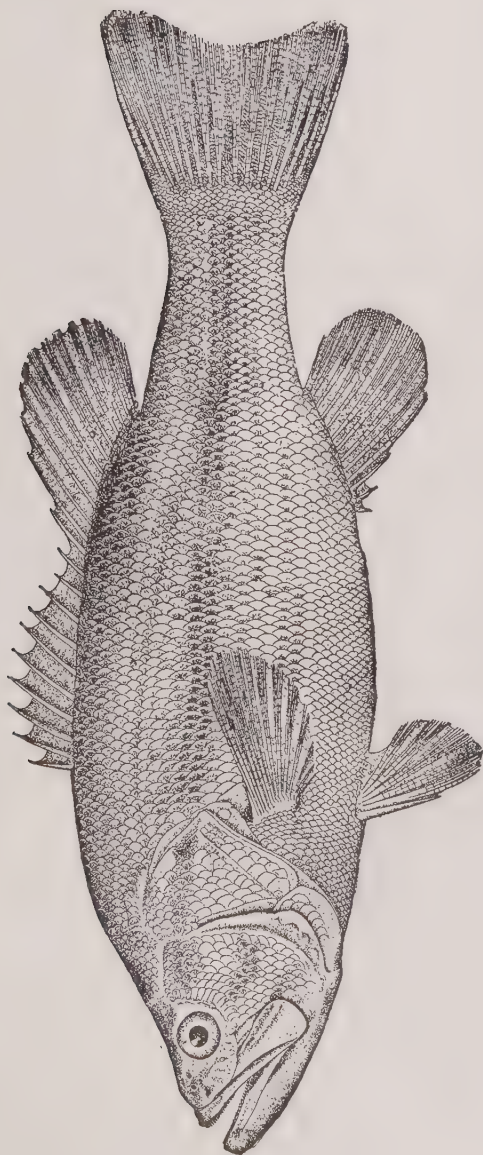


Fig. 1. Large-mouthed black bass, first introduced into the waters of California in 1891, when 2,000 yearlings were placed in Lake Cuyamaca, in San Diego County, and 620 in the Feather River near Gridley, Butte County. In 1895 another shipment was received from the United States Fish Commission and placed in ponds at the Sisson Hatchery, from which place they were distributed to all parts of the state.

LARGE-MOUTH BLACK BASS—*Micropterus salmoides*.

10. A shipment of eighteen full-grown wall-eyed or glass-eyed pike, or pike perch (*Stizostedion vitreum*) was brought to California in 1874 from the Missisquoi River, Vermont, and sixteen were planted in the Sacramento River, near Sacramento City; but they did not multiply.

11. The tautog (*Tautoga onitis*) was first brought to California by Dr. Livingston Stone in 1874, and a second lot in 1897. Both shipments were deposited in San Francisco Bay; but they consisted of only a few hundred fish each and no results were obtained.

12. Four full-grown rock bass (*Ambloplites rupestris*) of the six obtained from the Missisquoi River, Vermont, were brought to California by Dr. Livingston Stone, in 1874, and deposited in Napa Creek, a tributary of San Pablo Bay, on June 12th. No known results have attended the planting of this fish.

13. In 1877, the California commission exchanged salmon and trout eggs with the Hawaiian Government for a shipment of 100 fish, known as the awa (*Chanos cyprinella*); they were planted in a small stream at Bridgeport, in Solano County. There is no record of any of this species having survived.

14. The eggs of the landlocked salmon (*Salmo salar sebago*) were first brought to California in 1878. Between that date and 1895 at least five shipments were received from the federal commission, totaling about 135,000 eggs. These were hatched at the San Leandro and the Shebley hatcheries, and the fry distributed in the cold lakes of the high Sierras, and in the lakes and streams of the Truckee Basin. A few fish have been taken that had reached maturity, but the species has not increased in numbers. The fish have been held in the hatchery ponds at Sisson for a time and have thrived, but no particular effort has been made to propagate them. A shipment of the eggs was hatched at Sisson hatchery and another lot at Bear Valley hatchery, in the early nineties.

15. One of the most important and successful importations of fish into California waters was made when the striped bass (*Roccus lineatus*) was introduced in 1879. The introduction of this valuable food fish was first suggested by S. R. Throckmorton, president of the California Fish Commission, in a letter to Professor Spencer F. Baird, then United States Commissioner of Fisheries. As a result of this suggestion, Dr. Livingston Stone was instructed to transport a shipment of striped bass to California. Accordingly, he collected from the Navesink River, in New Jersey, 132 fish, ranging from one and one-half to five inches in length, and thirty medium-sized fish. Twenty-five of these died en route, but the remainder, about 135, were deposited in the Straits of Carquinez, at Martinez. Individuals from the first lot were caught in the lower waters of the bay within a year from the time that they were planted, and a number were caught occasionally for several years afterward; but the commission decided to have a second shipment made from the East, as it was not certain that the fish were increasing. Accordingly, in June, 1882, Mr. J. G. Woodbury was sent East by the California Fish Commission to procure another shipment. He collected 450 fish five to nine inches long from the Shrewsbury River, New Jersey, and in the latter part of July arrived with a little over 300 of the fish in good condition; they were planted in Suisun Bay, at Army Point,

near Suisun. Considering the small number of fish introduced and their remarkable increase in a few years, the result obtained from the introduction of the striped bass into California is one of the greatest feats of acclimatization of new species of fish in the history of fish-culture. In 1889, hundreds of them, weighing from one-half to a pound each, were being caught and sold in the San Francisco markets. From 1889 to 1892, the number caught had increased 250 per cent; such quantities were being taken in 1889, it was feared the fish would be exterminated before they had come to maturity and had a chance to reproduce; so the Supervisors of San Francisco County, at the request of the Board of Fish Commissioners, passed an ordinance prohibiting the sale of striped bass under eight pounds in weight. A state law was afterward passed making it unlawful to take bass under one pound; and later this was changed to the present limit of three pounds. It is now also unlawful to ship striped bass from the state. The striped bass is one of the finest food and game fishes in the United States; and if the California Fish Commission had not succeeded in acclimatizing any other variety of fish, the value of the striped bass alone would more than repay the people for all the money expended in introducing other species. Over two million pounds of striped bass have been marketed in one season in San Francisco. This does not include the amounts sold in other places.

16. In 1891, 3,000 yearling yellow or ringed perch (*Perca flavescens*) were deposited by the United States Commission in the Feather River, and 3,980 in Lake Cuyamaca, in San Diego County, where they increased rapidly. A few were taken to Sisson hatchery and placed in the rearing ponds, in 1895. They remained healthy and made a good growth, but owing to lack of pond room no efforts were made to propagate them to any extent. Occasionally a few have been taken from the Feather River and from some of the sloughs in that region, but as the species has not been generally distributed, the results of the planting have not been fully determined.

17. Four hundred yearling warmouth bass (*Chænobryttus gulosus*) from Quincy, Illinois, were planted by the United States Commission in Lake Cuyamaca, near San Diego, in 1891. In the same year, 100 yearlings were deposited in Feather River, near Gridley, Butte County; and in 1895, twelve fish were delivered at Sisson hatchery, but they were not in good condition. Six of them died shortly after they were placed in the ponds; the remaining six survived until the following spring, but food conditions not being suitable, they did not thrive and died before spawning.

18. The crappie (*Pomoxis annularis*) and the strawberry or calico bass (*Pomoxis sparoides*) were introduced in the early nineties, but were not widely distributed. In 1891, 285 yearlings were deposited in Lake Cuyamaca, near San Diego, and in 1895, 50,000 fry were sent to the Sisson hatchery; but none of them lived.

19. In 1891, a shipment of 400 yearling pike (*Lucius lucius*) was made to Lake Cuyamaca, near San Diego, and another 100 were placed in the Feather River, in Butte County. The fish planted in Lake Cuyamaca increased for a time, but those in the Feather River have not multiplied. In 1895, six pike were delivered at Sisson hatchery; they thrived in the ponds for a year, when they were placed in an aquarium

at the Mechanics Fair, in San Francisco, and died before the fair was over. It is well that they died and that those planted in the Feather River did not survive; for the species is too predatory to plant among our valuable fishes.

20. In May, 1893, the New York commission gave 100,000 muskellunge fry (*Lucius masquinongy*) from Chautauqua Lake to the California Fish Commission. The United States Bureau of Fisheries transported the fish free of charge as far as Ogden, from which place the consignment was under the auspices of the California commission, the Spring Valley Water Company paying half the cost of transportation from Ogden to San Francisco. The fish were received in good condition, and 93,000 were placed in Lake Merced, near San Francisco, to destroy the carp in the lake, as they were keeping it roily and made the water almost unfit for use, but they did not survive; and as in the case of the pike, it is probably as well that they did not, for while they are a game fish, they are too predaceous to place among our more valuable fishes. These fish were put in private waters with the understanding that the commission might take such fish for distribution or breeding purposes as might be desirable.

21. The lake trout (*Salvelinus namaycush*), known also as the salmon or Mackinaw trout, was first brought to California in 1894. The shipment of 100,000 eggs was hatched at the Sisson hatchery, with a loss of only 7 per cent. Sixty-five thousand of the fry were planted in Lake Tahoe in May, 1865, the remainder being held in the ponds at the Sisson station and shipped the following season. Several other lots were hatched at Sisson, and the fry deposited in the lakes of the Truckee Basin. A number of these fish are taken each season from the waters that have been stocked, where they have thrived to a considerable extent, but not as well as was expected. This trout is abundant in the waters of lakes Superior, Huron, and Michigan, and should attain a large size in Lake Tahoe, as the species is adapted to cold, clear, deep lakes.

22. In February, 1894, 20,000 eggs of the Loch Leven or Scotch lake trout (*Salmo trutta levenensis*) were sent to the California commission from the stock ponds of the United States Government at Northville, Michigan. They were hatched at Sisson hatchery, and the fry deposited in the hatchery ponds, where they thrived. The stock has been retained in the Sisson hatchery ponds ever since, where they have been propagated successfully, and thousands of the fry are shipped each year for distribution in the public waters of the state.

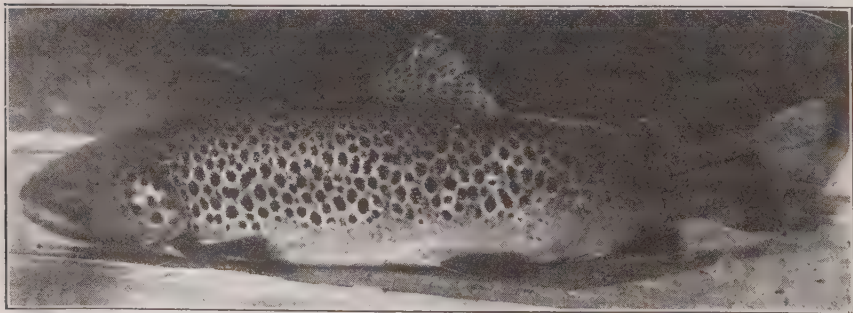


Fig. 2. Loch Leven trout. The original stock of Loch Leven trout was received in 1894, when 20,000 eggs were received from the United States Fish Commission Hatchery at Northville, Michigan. Thousands of Loch Leven trout fry are now shipped out from the Sisson Hatchery each year.

The Loch Leven and the German brown trout are closely allied and appear to be but different varieties of the same species. They are somewhat different in their habits, but do equally well in the clear, cold lakes and streams of the Sierras, as well as in the region around Mount Shasta. The two varieties have been crossed at the Sisson hatchery, and have produced a strong, game fish.

23. In 1895, 135,000 Von Behr or German brown trout eggs (*Salmo fario*) were hatched at the Sisson hatchery. Several thousand fry were placed in the ponds to be raised for breeders, and the remainder were distributed in a number of the lakes and streams of the high Sierras. Previous to this the federal government had made several plants in the state.

24. Twelve yearling white bass (*Roccus chrysops*) were received at Sisson hatchery from Quincy, Illinois, in June, 1895. They were not in good condition and seven of them died shortly after their arrival; the others died the following fall. This introductory shipment of white bass is the only one of which there is any record.

25. Small plants of the green sunfish (*Lepomis cyanellus*) and the bluegill or blue bream have been made in California. In 1895, twelve yearlings were delivered to the Sisson hatchery; eighteen were put in Elsinore Lake, and eighteen in the Bolsa Chico River. A few were accidentally introduced with other fish into Lake Cuyamaca, near San Diego, in 1891. Wherever conditions are favorable, these fish have thrived.

26. The California Fish Commission has endeavored to introduce the Montana grayling (*Thymallus montanus*) into the waters of California, but so far without any known results. The eggs are very delicate and the fry hard to raise. In 1904, 100,000 eggs, from Bozeman, Montana, were received at the Sisson hatchery in good condition. Seven thousand of the fry were placed in a pond that was thought suitable for them; they thrived for eighteen months, then became diseased and died off, until only 600 were left; these were placed in a pond where they were in an entirely wild state and could subsist on natural food. These fish and a few that were saved from a lot received the following year grew up together and promised to furnish some eggs for propagation, but owing to the accidental bursting of the pond wall, the fish escaped into one of the tributaries of the Sacramento River, just as they were reaching maturity. Several thousand of the fry were distributed from the second lot of eggs that were received, into waters that, from descriptions given of the fishes' habits, appeared to be ideal, but no results have been noted thus far. The grayling is considered by some anglers to be the most beautiful and graceful of American fresh-water fishes. They rise to the artificial fly more quietly than do the trout, but make a good fight and are an excellent table fish.

The last lot of fresh-water fishes received in California from the United States Bureau of Fisheries was in November, 1908. The fish were shipped from Meredosia, Illinois, and consisted of crappie (*Pomoxis annularis*), blue-gilled sunfish or bream (*Lepomis pallidus*), and yellow perch (*Perca flavescens*). They were distributed as follows:

Four cans of crappie and sunfish in Honey Lake, Lassen County; a number of yellow perch and crappies in Vera Lake, Nevada County;

sunfish and yellow perch in lakes in Placer County, and in sloughs of the Feather and Sacramento rivers; some of all three varieties near Stockton, and in Clear Lake, Lake County; perch and sunfish in Kings River and San Joaquin River, and sunfish and yellow perch in Kern River and Buena Vista Lake. Some of the fish were planted in Russell's Lake, Ventura County, and in suitable waters in Los Angeles, Riverside, and Orange counties. Reports from several of these places have been received and indicate that the fish are thriving and increasing.

No effort has ever been made by the commission to introduce eastern oysters, but it is stated that they were first brought into California in or about 1870, by Mr. A. Booth of Chicago, and it is recorded that the first shipment, consisting of three carloads of large oysters, so overstocked the market that in order to avoid loss the consignee had to plant in San Francisco Bay all the stock not promptly disposed of. The enforced planting resulted favorably, and it became the custom to annually ship one-year and two-year seeds to be planted on the grounds in the southern part of San Francisco Bay, where they remained for two and three years, or until they attained a suitable size for marketing. There have been various reports of wild eastern oysters taken at different points in the bay, and Mr. Chas. H. Townsend, in the Report of the United States Fish Commission for 1889-91, says: "It is possible that during the long time eastern oysters have been kept in the bay they have become in a measure acclimated, and that there is a constantly increasing tendency to propagate—that is, the progeny of oysters grown here become hardier with each generation and better adapted to the colder but more equable waters." Full accounts of the early eastern oyster industry in San Francisco Bay are given in Mr. Townsend's article and in an article by Captain J. W. Collins, in the Report of the United States Fish Commission for 1888.

From 1899 to 1908 the oyster industry decreased gradually, all of the oysters taken in the latter year being taken from private beds, and used for market purposes only. All seed oysters planted that year were shipped from eastern beds.

The appearance of the soft-shell clam in San Francisco Bay was first noted in 1874. The spawn is supposed to have been accidentally introduced with the carloads of eastern oysters planted in the vicinity of San Francisco. They soon covered the mud flats surrounding San Francisco Bay, and were taken in great numbers.

THE FISH DISTRIBUTION OF 1916.

By G. H. LAMBSON, Superintendent Sisson Hatchery.

When the last carload of trout left the hatchery we gave a sigh of relief to think that the arduous work of the past four months had been brought to a successful conclusion, and that so many fine trout had been planted in the public waters of the state, where all could enjoy the pleasure and profit of catching them. There were the gamy steel-head, the beautiful eastern brook trout, the black-spotted trout from the cold waters of Tahoe, the Loch Leven trout whose ancestors came from Scotland, and last but not best our own native favorite—the rainbow. They were fine, lusty fellows, and all were sent forth to the waters best suited to each kind, to add to the health and pleasure of our people.

Our thoughts turned to the many anglers who, by purchasing licenses, supported the hatcheries and made the great work possible. But they have their reward, for any one who catches but two pounds of trout during the season is repaid in a medium as valuable as gold, while he who catches as much as twenty pounds receives a thousand-fold return. But there is a greater value, more subtle, but none the less real, that of the health and pleasure of the people. On any summer night along a hundred streams and lakes may be seen gleaming the campfires of the happy anglers, camping out and breathing the health-laden air of wood and stream. The worried business man, the weary laborer, the professional man, all are there, often, with their entire families, and all reaping a greater profit than could be had from any other investment, for health and pleasure are the dividends.

Our state is famous for its beautiful women and keen, alert men of business, and if the cause could be sifted into its component parts I wonder how much would be found to be due to our well-stocked streams? Surely it would be very large.

The favorite prescription of the physician is to "take a rest, go out into the country and live next to nature," and, I would add, come back with renewed vigor for the strenuous life of today. But the physician's advice is disregarded unless there is some incentive to urge them on, and this is supplied by the fine fishing in our streams and lakes which are stocked annually from the hatcheries.

The commercial side has also received close attention and millions of salmon have been planted in the Sacramento and Klamath rivers. They were not the small fish of the earlier season, but fine, big, well-fed yearlings from three to six inches long, fish that are fully able to cope with the dangers that beset them on their journey to the sea, and which will return in from three to six years as mature salmon and add to the wealth of the state, to the delight of the angler, and to furnish a delicious food to those who must, perforce, procure their fish from the market. In our twenty years' experience in salmon work we have never seen planted such large and healthy fish as those distributed this season.

In the distribution from the Sisson hatchery there were forty-three carloads of the various kinds of trout, each averaging 100 cans, and

many thousands were sent out by messengers. There were fifteen carloads of salmon planted in the Klamath River, while the Sacramento was stocked direct from the hatchery by wagon. We can not conceive of a better investment, or one that benefits a greater number of people than the hatcheries. Every class and family, the angler, the commercial fisherman, the dealer or packer, all share in the dividends which are declared daily. Truly our state is a favored one.

SCIENTIFIC NATURE STUDY IN THE PUBLIC SCHOOLS.

By GEORGIE V. MILLER.

We are apt to think of the law of supply and demand as an important and everlasting plan which no amount of neglect will spoil. It is not usually until the loss caused by waste or mismanagement directly affects us that we begin to consider a way to prevent a crisis.

Forests, for example, a few years ago were found to be deteriorating so fast that the government and different states took up the matter of their conservation with added seriousness of purpose. Courses of forestry were established in the various colleges, and conditions partook of a new aspect.

That was the medieval step in forest conservation through education. The modernist perceives cooperation through enlightenment of the people at large—not of the few whom the university courses directly reach. "Teach the children of the public schools the common names and uses of the trees," said Professor Tower of the Department of Forestry, University of Maine. "This will create in them a desire for further knowledge of the subject, and give them, not too late, a reason for the folly of waste."

Don Carlos Ellis, in charge of educational work for the United States Forest Service, made an everlasting impression upon the school children of San Francisco who were so fortunate as to hear his lectures and see their accompanying motion pictures, during the recent exposition. The United States Forest Service is placing emphasis on the educational method of forest conservation.

A campaign is on for the conservation of wild life through education. The courses are so well conducted and attended, and the names of those in charge so familiar, that I need not dwell upon this phase of the work. Be it sufficient to say, however, of wild life as a study, that its really systematic introduction occurs, generally speaking, in the university. Nearly all the work in the grades is merely incidental. A hint to us that the children will be sought in case of a doubtful situation, is the recent urgent appeal to them to save all newspapers against a possible paper famine. Then give the children something substantial in nature study. Beside its scientific and economic lessons

the work has its moral and artistic values, the habit of killing being reduced to a minimum when students have learned to thoroughly enjoy animals and birds alive through knowing them. The study will prove pleasurable to them and profitable to everyone.

A country or suburban teacher has not far to look for available material. I found the boys knew the local birds, and were desirous of studying their habits more closely. Next came birds of exceptional interest from other regions, for nature study should no more be confined to one small corner of the world than is geography.

It was not until last year that I ventured to introduce bird study in a city school. Leo Wiley, collector of specimens, had sent me a number of bird skins as an aid. Several lessons had been given after my usual method of procedure, when I promised to show the class on the following day the skin of a California roadrunner.

Unusual excitement followed this announcement. The majority of the boys thought it a new kind of automobile. How could I show the skin of a machine? But the girls were sure it was a snake, and shivered becomingly. Not one had ever seen a roadrunner. They examined the stiff eyelashes, speculated upon what the bird must eat, marveled at the length of his legs, now fully understanding why the Spanish called him "*correo del camino*," which our Anglo-Saxon pioneers later translated to roadrunner.

Each of the specimens was shown many times, not only to the members of my own class, but to others. The boys had spread the news, and so extravagantly that many believed my supply equal to a museum's. I was gratified, even though enthusiasm had got the better of veracity in several instances. I felt like the Pied Piper, only that in our case a way to new observations had been opened to the children without the closing of a mountain, behind which lay the joys of childhood.

That those boys will look and listen when afforded an opportunity I have no doubt. During vacation a newsboy whose name was unknown to me, tucked a copy of the "Bulletin" under my arm. He smiled sweetly, and I was about to pay him when he shook his head and rushed after a prospective customer. On his way I heard him reply to a companion, "No, not mine—the big guys' teacher; the one that knows everything about birds."

So many teachers have expressed the desire for something definite as an aid to the introduction and presentation of the subject of birds, that I submit the following outline. This I have used successfully, in more or less the same form, a number of years. There are innumerable

reference books, among them Mrs. Bailey's "Handbook of Birds of the Western United States," than which none is more complete at the present time.

DETAILED OUTLINE FOR THE STUDY OF ANY BIRD.

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| <p>I. Location.</p> <ol style="list-style-type: none"> 1. State or portion of state. 2. Woods or open. 3. Swampy or dry section. <p>II. Description.</p> <ol style="list-style-type: none"> 1. Size. <ol style="list-style-type: none"> (1) Compared with robin. (2) Compared with English sparrow. 2. Shape. <ol style="list-style-type: none"> (1) Body. <ol style="list-style-type: none"> a. Long and slender. b. Short and stocky. (2) Head. <ol style="list-style-type: none"> a. High or crested. b. Small and nearly horizontal with body. (3) Bill. <ol style="list-style-type: none"> a. Large and strong. b. Short and stocky. (4) Tail. <ol style="list-style-type: none"> a. Long. b. Short. c. Notched. d. Forked. e. Rounded. (5) Wings. <ol style="list-style-type: none"> a. Long. b. Short. (6) Feet. <ol style="list-style-type: none"> a. Large and strong. b. Small and weak. 3. Color. <ol style="list-style-type: none"> (1) Upper parts. (2) Lower parts. (3) Special markings. <ol style="list-style-type: none"> a. Chin. b. Eye. c. Rump. d. Tip of tail. e. Under tail parts. f. Outer tail feathers. g. Wings or wing bars. h. Belly. i. Breast. 4. Movements. <ol style="list-style-type: none"> (1) On the ground. (2) In flight. (3) On perch. | <p>III. Family.</p> <ol style="list-style-type: none"> 1. Sparrow-finch. 2. Swallow. 3. Flycatcher. 4. Goatsucker, swift, hummingbird. 5. Lark. 6. Warbler. 7. Thrush. 8. Waxwing. 9. Tanager. 10. Wren, thrasher. 11. Vireo. 12. Kinglet. 13. Oriole, blackbird. 14. Crow, jay, magpie. 15. Kingfisher. 16. Nuthatch. 17. Woodpecker. 18. Shrike. 19. Owl. 20. Hawk, eagle. 21. Vulture. 22. Grouse, partridge, quail. 23. Snipe. 24. Plover. 25. Roadrunner. <p>IV. Food.</p> <ol style="list-style-type: none"> 1. Vegetable. 2. Animal. 3. Manner of obtaining— <ol style="list-style-type: none"> (1) While in flight. (2) Flying from perch. (3) From trees or insects in trees. (4) From the ground. <p>V. Song or call.</p> <p>VI. Residence.</p> <ol style="list-style-type: none"> 1. Summer. 2. Winter. 3. Permanent. 4. Transient. <p>VII. Migration.</p> <ol style="list-style-type: none"> 1. Time. 2. Place. <p>VIII. Nesting.</p> <ol style="list-style-type: none"> 1. Time. 2. Place. 3. Kind of nest. 4. Eggs. <ol style="list-style-type: none"> (1) Number. (2) Color. (3) Size. 5. Young birds. |
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CALIFORNIA FISH AND GAME

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January 20, 1917.

"The United States is not yet ours in the proudest sense, and can not be until we are doing all that can be done to give to all its people and to the world the full expression of its highest intelligence applied alike to its resources and to the life of the people."
—Franklin K. Lane.

WILL YOU DO YOUR SHARE?

Please read again the above quotation by Franklin K. Lane, Secretary of the Interior, and emphasize the words "full expression" and "resources." What is California's "full expression of its highest intelligence applied to its fish and game resources?" Is it the still noticeable disregard for protective laws? The noticeable waste of a valuable food supply? The neglect of valuable species reduced to the danger point? The tolerance of the game hog? No! The full expression of California's highest intelligence is more than this. With the convening of the legislature this month there is opened another chance to better game conditions and conserve for the future the wild life resources of the state. The goal suggested above can only be reached when all the people of the state take an interest in fish and game and do their share toward its realization. See that your representatives believe in "conservation" and back up their belief with action. Do your share!

WHAT DO YOU WISH TO KNOW ABOUT FISH AND GAME?

The Bureau of Education, Publicity and Research of the California Fish and

Game Commission should be made a clearing house for information on fish and game. Are you not anxious to know the truth regarding the life and habits of some game species? The number of false stories which are current is appalling. Settle your disputes by writing the bureau. If we are unable to answer your question we will refer it to someone who can answer it. The reply will be sent you by mail or will appear in the columns of CALIFORNIA FISH AND GAME, at your pleasure.



CARL WESTERFELD.

NEW EXECUTIVE OFFICER.

At a called meeting of the State Fish and Game Commission, held at Sacramento on December 8, 1916, Carl Westerfeld, fish and game commissioner since November, 1911, resigned as commissioner and Mr. Edward L. Bosqui of San Francisco was appointed by Governor Johnson to fill the vacancy. The commission then appointed Mr. Westerfeld as executive officer to succeed Ernest Schaeffle, who resigned in September, 1916. All who know Mr. Westerfeld are congratulating the commission on its choice and the whole state on its good fortune in obtaining the services of so capable a man.

Carl Westerfeld was born in San Francisco and has lived in that city all of his life, with the exception of the few years spent at college. He took his A.B. at Yale University in 1893, and in 1896

graduated from Hastings College of Law. He was admitted to the bar and has since made a name for himself in his profession. His interest in fish and game led to his appointment as commissioner, and to his election as president of the Pacific Fisheries Society in 1914. For the past five years Mr. Westerfeld, although having many personal interests, has given a great deal of time and attention to the work of the Fish and Game Commission, and consequently is in close touch with its activities and plans.

THE BIENNIAL REPORT.

Clothed in an attractive colored cover showing a mountain lion in wait for deer, the Twenty-fourth Biennial Report of the Fish and Game Commission is off the press and ready for distribution. The report covers the period from July 1, 1914, to June 30, 1916, and gives in detail the work accomplished by the commission.

The main body of the report, which is a summary of the activities and accomplishments of the commission, is followed by departmental and district reports and by an appendix giving a roster of employees, an inventory of state property, the distribution of fish by counties, the distribution of game birds, and full statistics on lion bounties paid, seizures of fish and game and illegally-used fishing apparatus, violations of fish and game laws, hunters and anglers license sales, and receipts and disbursements. Nearly one hundred halftones illustrate the report. Conspicuous among these illustrations are pictures showing the work of the deputy, a series showing how fish are transported from the hatchery to the stream, seining fish from overflowed districts in the San Joaquin Valley, feeding quail during severe winter weather and various fishways, screens and hatchery buildings.

The report clearly shows that the past biennial period has been one of marked advance in the protection and preservation of wild life, the propagation of fish, the stocking of streams, the construction of fish ladders and screens, and above all, in the accumulation of data on fish and game and the development of a public sentiment favoring wild life conservation. All of the duties of the commission, as above outlined, have been performed as

fully and faithfully as the financial and other resources have allowed.

More arrests have been made and more convictions obtained in this than in any previous biennial period.

Educational and publicity work has been largely augmented and one department gives almost its entire time to work of this kind.

The game refuges of the state have been enlarged by the addition of 782,998 acres of national forest lands, which were set aside by the last legislature.

The new and amended fish and game laws of the 1915 legislature have proved to be important conservation measures. Noteworthy in this legislation was the elimination of "bull hunting," the changing of the laws to accord with the Federal Migratory Bird Law and the shortening of seasons and lowering of bag limits.

Large numbers of deer and quail were saved from starvation during the severe winter weather of 1916.

Through the payment of 162 lion bounties in 1915 and of 111 during the first six months of 1916, thousands of deer have been saved from death at the hands of these predators.

Sixty-eight assistants or deputies have carried on active patrol duty, and although some of them patrol areas greater than the state of Vermont, yet wild life has been safeguarded to a remarkable degree.

Sufficient fish were liberated during the year 1915 to furnish every resident of the state with sixteen fish. The hatcheries and egg collecting stations have been operated to their full capacity and the streams of the state are already showing the result.

The department of commercial fisheries, established in 1914, has accumulated important data on the fisheries of the state and has been instrumental in aiding in the development of certain neglected fishery resources.

The attainments recorded in the twenty-fourth Biennial Report indicate that much has been accomplished during the period from July 1, 1914, to June 30, 1916, towards the conservation of fish and game resources in the state of California and that the people of the state may justly be proud of the board which administers these resources. Certainly no other fish and game commission has accomplished more in the same period of time.

HOW LONG?

How long! How long, will the people of the state of California allow officers in state employ to be murdered by aliens, many of whom go unpunished?

Several years ago Bert Blanchard, a deputy of the Fish and Game Commission, was found dead in the hills of Contra Costa County. He had been shot by some hunter, probably an alien. Some years after Ernest Reynaud, another deputy of the commission, was killed by Italian fishermen near Greenbrae. Mr. Reynaud, along with M. S. Clark, had arrested two Italian fishermen. When a third Italian was taken into the boat as interpreter a fight followed, with the result that Mr. Reynaud was killed and Mr. Clark, being thrown out of the boat, only succeeded in saving his life by swimming to shore. Fortunately the man responsible was apprehended and sent to San Quentin for life. Soon after Deputy Frank P. Cady of Susanville was shot in the leg by an Indian violator. In the discharge of his duties Deputy George J. Rodolph was shot by two market hunters near Los Banos. The guilty man was acquitted by a jury and his companion was discharged on a preliminary examination.

As we go to press word comes that Deputies Ray Heacock and Richard Squire were murdered by aliens on Bouldin Island near Terminus, San Joaquin County. Deputy Squire was found in the boat, shot through the head and the boat and his clothing riddled with bullets. The body of Deputy Heacock has not been found at the date of writing. Earlier the same night two white fishermen, at the point of revolvers, were told to move on by four Italian fishermen. The same men later killed these two deputies while they were in the discharge of their duties.

Pennsylvania's answer to outrages of this kind was a law prohibiting the carrying of firearms by aliens. At the time this law was passed it was pointed out that a very large percentage of all the murders in Pennsylvania were committed by aliens. The measure was, therefore, a measure not only to more largely protect fish and game, but to protect human life. Will California take the same steps to stop crimes of this sort?

THE CLOSED SEASON.

The coming few months are especially set aside as a closed season when no hunting whatever is allowed. The most fundamental law of conservation is that animals must be protected during the breeding season. If the parents are killed at this time the young are left to starve. Animals during the breeding season become remarkably tame and the killing of them at this time is not sport but wanton murder. Do your share to protect all wild life on its breeding grounds and see that all your friends and neighbors do likewise.

BOY SCOUT COOPERATION.

Believing that many of our readers will be interested in seeing what boy scouts in this state are doing for the conservation of wild life we are instituting a department in which the scouts will have a chance to demonstrate their work. Only a beginning has been made in this cooperative work and we may expect to see a steady improvement in the output of the boys.

The Fish and Game Commission is endeavoring to do its share by furnishing free stereopticon lectures to the different troops.

HEAVY PENALTY IMPOSED FOR SMUGGLING DUCKS.

A. L. Mason, of Los Banos, was arrested and fined \$500 and sentenced to 150 days imprisonment for attempting to smuggle ducks to the San Francisco markets. Mason had 457 ducks in a small machine, and was headed for San Francisco, when by merest chance he was apprehended. He appealed to Night Watchman Michael Collins of Redwood City to help him fix a blow-out, and in the search for a new inner tube the ducks were uncovered. The sentence, imposed by Justice of the Peace George Seely of Redwood City, is the heaviest on record for an offense of this kind.

THE FOOD OF DUCKS IN CALIFORNIA.

If increase of food supply means increased numbers of a game species, it is reasonable to believe that were it possible to furnish artificially additional food for waterfowl, greater numbers would not only be attracted to this state, but many would doubtless remain and breed. The



Fig. 3. Large Loch Leven trout taken in the Owens River by Guy H. Dusenbery of Bishop, Inyo County. Photograph by J. H. Von Blon.

The large Loch Leven trout shown above was taken in the Owens River, about twelve miles north of Bishop, Inyo County, by Mr. Guy H. Dusenbery in November, 1916. A huge hook—probably an Indian's—was found imbedded in its jaw. Probably as a result of this hook the fish was of light weight considering its size. In good condition it would probably have weighed eight pounds. The size of the fish is remarkable in that Loch Leven trout planted by the Fish and Game Commission in the Owens River but seven years ago. The weight of this fish, therefore, indicates a growth of approximately a pound a year.

inroads on the natural food supply made by reclamation can be counterbalanced by artificial planting of those plants furnishing food for waterfowl. More and more interest is being taken in this conservation measure.

To the man or the club seeking information on the proper food plants to grow we recommend the following bulletins:

Three important wild-duck foods, U. S. Dept. Agric. Bur. Biol. Surv., Circ. 81, pp. 1-19.

Five important wild-duck foods, U. S. Dept. Agric. Bull. 58, pp. 1-19.

Eleven important wild-duck foods, U. S. Dept. Agric. Bull. 205, pp. 1-26.

All of these bulletins deal more largely with Eastern conditions, however, and nothing but experiment will demonstrate the value of many of the species for our conditions. In order that more detailed information be available for Californians, the Bureau of Education, Publicity and Research of the Fish and Game Commission has begun an investigation into the food of wild ducks. Hundreds of stomachs have been collected and the contents of these are being analyzed and the results tabulated. Already nearly a hundred stomachs have been examined. When the investigation is completed, evidence as to the seeds, roots and bulbs most often fed upon by the different species of wild ducks will be at hand. It will then be possible to make better recommendations as to the best native food plants to grow in order to attract waterfowl.

STATE FAIR EXHIBIT.

The Fish and Game Commission maintained an extensive and interesting exhibit at the California State Fair, held at Sacramento during the early part of September. Owing to the greatly increased number of exhibitors at this year's fair, the space allotted the commission's exhibit was not as much as desired, but, fortunately, was so located as to be directly in front of the main entrance and in the path of the thousands of visitors, both when entering and leaving the grounds.

A unique octagonal pavilion, forty by forty feet, was constructed of fish nets that had been confiscated from fishermen

using them in an illegal manner. An additional lot of confiscated nets, making a pile twelve feet high by twenty feet wide, was shown on the outside of the pavilion.

Large aquaria showing splendid adult specimens of various species of trout, also troughs showing the propagation of trout from the egg to the time when the young fish are liberated, attracted much attention.

All of the species of trout to be found in this state were shown in jars, also some twenty-five species of freshwater fish taken from the San Joaquin and Sacramento delta districts, together with photographs showing deputies of the commission engaged in seining and distributing these fish. Portable pens containing pheasants, quail and deer from the State Game Farm at Hayward, together with mounted specimens of birds and mammals, did much to complete the attractiveness of the exhibit.

There were photographs of the fish hatcheries, the fish distribution car, and a series of splendid pictures showing the work done by the commission in collecting and distributing golden trout to the almost inaccessible lakes and streams of the high Sierras by means of mule pack train. Fish-culturists of the commission were in attendance to explain the artificial method of propagation. The thousands of people who viewed the exhibits went away with a better understanding of the splendid work that is being accomplished by the California Fish and Game Commission.

PRACTICAL EDUCATION.

The Irving School of Riverside, Riverside County, has received the honor of being listed by the New York Audubon Society as one of the ten schools in the United States "standing highest in the contest relating to the identification of local and migratory birds." The fifth grade of the school sent in a list of eighty-one species of birds observed in the near vicinity. Hundreds of schools in the United States entered the contest.

To increase the appreciation of California's many songbirds, the San Diego County Board of Education requested all grades and high schools to give particular study to birds from November 6 to 17, as preparation for a contest based on compositions written on the following



Fig. 4. The Fish and Game Commission exhibit at the State Fair, September, 1916.

subjects: "What I observed in one week," "Bird nests," "Mountain birds," "Our most useful songsters," "Sea birds," and any subject requiring keen observation. The papers were graded on quality and the length of each was left to the discretion of the teachers.

The exposition company offered 100 free admissions for the best 100 papers, and 15 medals for the best 15 papers. Papers were graded by November 14 and the best compositions chosen from every grade and one from every class in the high school. The best products of the

art department, showing birds, were exhibited at the exposition, and remained through Bird House Day celebration, held December 15. The commercial departments exhibited designs, the sewing classes exhibited bird embroideries and the music classes sang bird songs.

In our opinion, studies of this kind are of far more value than many of the prescribed courses of study. A child that is "taught to read a roadside as well as to read a book" is worth more to himself and more to the community in which he lives.

THE TREATY WITH CANADA.

Conservationists the country over are rejoicing because of the passage of the Canadian Treaty, which supplements the Federal Migratory Bird Law. The following is a summary of the main provisions:

1. That no bird important to agriculture because of insect-destroying proclivities shall be shot at any time.

2. That no open season on any species of game birds shall extend for a longer period than three and one-half months.

3. That both countries shall so restrict open seasons on game birds as to prevent their being taken during the breeding season.

4. That there shall be no shipment from one country to the other of birds which are taken contrary to law.

atically record arrivals and departures and consequently miss the elation as evidenced in a card recently received from one of our readers.

"Winter Resorts.

"SOCIAL ITEMS.

"Mr. Robin has arrived at the Lastreto Woods, Atherton, and was very busy investigating conditions and making arrangements for Mrs. Robin and his numerous family preparatory to their customary winter sojourn. His rotund form was visible on Tuesday morning, the 7th inst."

Probably few others in the vicinity of Atherton, San Mateo County, even noticed that the western robin had returned for his winter stay. Ignorance regarding bird life in California is great even among



Fig. 5. Deputies of the Fish and Game Commission at work in the marshes of the San Joaquin Valley. From left to right are deputies Smalley, Brownlow, Smith, Maloney, Kimball, Squires, Hoen and Matthews. Photograph by J. E. Newsome.

The treaty is to remain in force for fifteen years and will continue in force beyond that time, provided the contracting powers do not give twelve months notice of a wish to terminate it.

MIGRATION RECORDS.

Many people in Eastern states obtain considerable pleasure by making notes regarding the arrival and departure of birds. Few people in California system-

people of leisure. We trust that as years go by a keener interest will be taken in our bird life and that instead of receiving a single notice of the arrival of a winter visitant, hundreds of cards will furnish data to show the southward progress of the different species from day to day. If any of our readers are looking for a stimulating hobby let them turn their attention to the recording of the arrival and departure of migratory birds.

GOAT ISLAND BECOMES NATIONAL GAME PRESERVE.

The Fish and Game Commission has for several years past liberated pheasants and quail on Goat Island in San Francisco Bay. Both pheasants and quail have been doing well. Due to the efforts of Captain Andrews, formerly commandant of the Naval Training Station situated on the island, who took an active interest in these birds, the island has been declared a federal game preserve.

The executive order, signed by President Woodrow Wilson, is as follows:

It is hereby ordered that Goat Island, containing about one hundred and forty-one acres of land, situated in San Francisco Bay, approximately midway between the cities of San Francisco and Oakland, Cal., shown upon Coast Survey Chart No. 5531, and as segregated by the broken

A TAMALPAIS GAME REFUGE A POSSIBILITY.

Large holdings on the northern watershed of Mount Tamalpais have been purchased by the Marin Municipal Water District. Much of this territory was formerly leased by the Lagunitas Rod and Gun club and game is very plentiful. Fearing that the opening of this area to the public would have the effect of destroying the game and thus taking pleasure from those who will use this territory for outings, a movement is on foot to make of this land a state game refuge, either under the section which allows the creation of reservations on private lands or by legislative enactment. Congressman William Kent, who is backing the scheme, has offered to contribute a sufficient sum to police the refuge.



Fig. 6. Saving fish from overflowed areas in the Yolo Basin. The fish saved from death in this way are planted in other streams of the state. Photograph by McCurry Company, August, 1916.

line upon the diagram hereto attached and made a part of this order, is hereby reserved and set apart for the use of the Department of Agriculture as a preserve and breeding ground for native birds, subject, however, to the use of the island for naval, military and lighthouse purposes in conformity to requirements of executive orders heretofore issued.

It is unlawful for any person to hunt, trap, capture, wilfully disturb, or kill any bird of any kind whatever, or take the eggs of such bird within the limits of this reservation, except under such rules and regulations as may be prescribed by the Secretary of Agriculture.

Warning is expressly given to all persons not to commit any of the acts herein enumerated under the penalties of section 84 of the United States Criminal Code, approved March 4, 1909 (35 Stat. 1104).

This reservation to be known as San Francisco Bay reservation.

WOODROW WILSON,

The White House, August 9, 1916.

TURKEY BUZZARD AND DISEASE.

Support for our contention that the turkey buzzard can not be considered a serious menace so far as its disease-carrying proclivities are concerned, as reported in CALIFORNIA FISH AND GAME for October, 1915 (Vol. 1, page 222), has come in a recent bulletin of the United States Biological Survey (Common birds of southeastern United States in relation to agriculture. Farmers Bull. 755). On pages thirty-eight and thirty-nine of this bulletin Mr. W. L. McAtee makes the following defense for the buzzard:

The turkey buzzard now is threatened with persecution in the land where heretofore it has received the most zealous protection, for the bird has been accused of spreading such diseases of live stock as hog cholera and anthrax. The charge that it spreads hog cholera has never been demonstrated, and until this is done

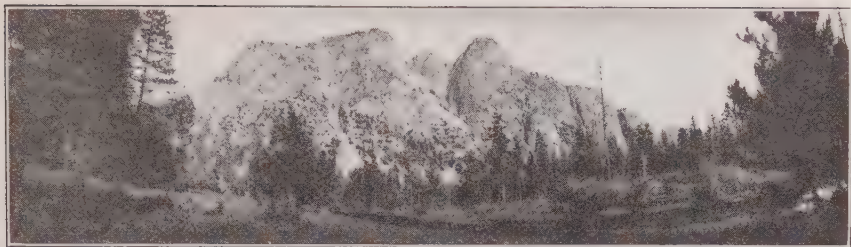


Fig. 7. Kern Buttes at mouth of Volcano Creek, a stream noted as the home of the golden trout. Photograph by A. D. Ferguson.

judgment should be suspended. Its relation to anthrax has been investigated, with the result that in the distribution of the disease the bird must be considered a minor agency as compared with man and various domestic and certain wild animals.

The nature of their food would indicate that buzzards have strong digestive powers. The spores of anthrax, or charbon, a virulent stock disease, have been shown by two independent investigations to be destroyed by passing through the alimentary canals of buzzards. Anthrax spores are not destroyed in the digestive tracts of other carrion-feeding animals, as the dog, cat, hog, chicken, or opossum.

It is true that buzzards may carry the germs of anthrax or other stock disease on their plumage, feet, or bills, and thus distribute them; but all the other animals just mentioned may similarly carry disease germs on the surfaces of their bodies, as may also flies, domestic pigeons and other poultry, horses, mules, and cattle, not to mention members of the human family. In fact, at the same time that steps are being taken greatly to reduce or exterminate a wild bird—the buzzard—which may possibly play a minor part in the transmission of anthrax, farmers are harboring several domestic animals that have far greater possibilities as spreaders of the disease. The fact that anthrax may be carried by flies is more than sufficient to explain the most severe epidemics.

Obviously, it is unfair to attempt to place the blame for general dissemination of stock disease on the buzzard. Considering the multitude of ways in which these diseases may be spread, it can not

be doubted that stock diseases would be as widely distributed as now if turkey buzzards were eliminated, as has been proposed. What amounts to proof of this is the fact that hog cholera at times is virulent and seriously destructive in regions where there are few or no turkey buzzards, as in certain northern states and Canadian provinces.

HABITS AND FOOD OF THE ROAD-RUNNER IN CALIFORNIA.

Results of further investigations of the economic status of nongame birds instituted by the Fish and Game Commission in 1911 have just been published under the title: "Habits and food of the roadrunner in California." (Univ. of Cal. Pub. Zool., vol. 17, no. 5, pp. 21-58, pls. 1-4, 2 figs. in text). For many years sportsmen have accused the roadrunner of destroying the eggs and young of valley quail and a study of the food habits of the bird was ordered. The contents of many stomachs of roadrunners were analyzed, but the results as shown by the following summary do not show the roadrunner to be a serious enemy of valley quail or other birds. Many specimens were secured in localities where quail were breeding but these showed no evidence that quails' nests had been disturbed.

The roadrunner (*Geococcyx californianus*) is unique in many ways. Of particular interest are its breeding habits



Fig. 10. Apparently the roadrunner has been falsely accused of destroying the nests and eggs of valley quail. Stomach examination has shown that insects, mice, lizards and snakes are fed upon and the eggs and young of birds seldom eaten.



Figs. 8 and 9. Waterfowl in the marshes of Fresno County. Photographs taken on the Thornton Ranch in southwest Fresno County by E. W. Smalley, July, 1916.

and especially food habits. It is doubtful if an investigation of the food habits of any other American bird could have yielded such spectacular results.

The investigation here reported upon included analysis of eighty-three stomachs of roadrunners taken in southern California in 1911 and 1912 and also a survey of all available literature relative to the food of the roadrunner in California.

The eighty-three stomachs represented birds taken every month of the year with the exception of March. The analysis of the stomach contents showed that practically 90 per cent (90.07%) of the total food was made up of animal matter and that slightly less than 10 per cent was of vegetable material. Nearly all of the vegetable matter was of one kind, the fruit and seeds of the sour berry (*Rhus integrifolia*). Insects and certain vertebrates composed the animal food. Chief among the insects found were beetles (18.2 per cent), grasshoppers and crickets (36.82 per cent), cutworms and caterpillars (7 per cent), cicadas and other hemipterous insects (5 per cent), ants, bees, and wasps (4.24 per cent), and scorpions (3.67 per cent). Lizards of three species (3.73 per cent), one bird (1.56 per cent), and two wild mice of two different species, composed the vertebrate food.

The results of stomach examination substantiated rather than altered published statements regarding the food of the roadrunner. From published sources, however, came added information as to the number of snakes and lizards consumed by this bird and practically all of the information regarding its bird-eating habits. One lizard, the whip-tailed lizard (*Cnemidophorus*) appears to be eaten more often than any other species.

The roadrunner's individual capacity for food is great, for an average full stomach contains about ten cubic centimeters of food. The collective capacity,

however, is small, due to fewness of individuals. The amount of damage possible (and this must be said also of the potential good) is greatly minimized because there is no concentration of individuals in any one place. A wide variety of food items from small insects to reptiles and mammals is consumed.

Little evidence was obtained that the roadrunner is detrimental to man's interests. The destruction of a few beneficial insects and birds, and of certain lizards usually considered beneficial, can alone be taken as evidence against it. Even if the consumption of a certain proportion of all of the above as food be a fixed habit, the end result is minimized when the facts are taken into consideration that the roadrunner is a bird of the desert regions rather than of the cultivated fields and that the species exists in but small numbers.

A preponderance of evidence favors the bird. The destruction of such unquestioned pests as grasshoppers, cutworms, caterpillars, and wireworms, and of such rodents as mice is to be desired even if the amount of destruction be relatively small. The taking of this sort of food on wild land is evidence that this bird when feeding in cultivated fields is likely to be distinctly beneficial.

Evidently the roadrunner never turns its attention to any sort of cultivated crops as do those birds with granivorous and frugivorous habits. On the contrary, a study of its food habits shows that the roadrunner feeds upon the insect and rodent pests which attack cultivated crops, and furthermore that it destroys hairy caterpillars, a pest not commonly attacked by other birds.

The investigation has also shown that the bird-eating habit of the roadrunner has probably been exaggerated and that the killing of the roadrunner by man as an injurious species is unjustified. The benefits conferred by the roadrunner in



Fig. 11. Daring teal ducks on Lake Elsinore. Photograph by J. H. Geiger, June 4, 1916.



Fig. 12. Decoy geese. Property of "Goose" Lewis of Dixon, California. Photograph by George Neale, May, 1916.

the destruction of insect and rodent pests plus its esthetic value leaves a balance distinctly in favor of the bird and marks it as a beneficial rather than an injurious species.

A "PAT ON THE BACK."

We have scrupulously refrained from publishing the many letters praising the work of the commission which come to the editor's desk, but the following editorial from the Ukiah *Times* for November 1, 1916, is such a fine appreciation that we can not refrain from giving our readers a chance to see it. Such a "pat on the back" is certainly encouraging.

GAME COMMISSIONERS DOING VALUABLE WORK.

"Through the courtesy of the State Board of Fish and Game Commissioners a copy of CALIFORNIA FISH AND GAME for October lies on *The Times* desk. It is the official monthly publication of the commission and the latest issue is the fourth number of the second volume. Not only is the board to be complimented on the contents of the October issue, but the editorial staff deserves commendation for the typographical makeup and neat appearance of the pamphlet.

"When the public realizes that all the commissioners are engaged in a labor of love, serving without financial consideration, the energy, judgment and hard work which they are throwing into their official task will be seen to entitle them to be regarded as mighty faithful servants of the people; this means of the public as a body, for while sportsmen are most keenly interested in the work of the commission, the propagation and conservation of game form a state asset, in the benefits of which every citizen figures.

"Inasmuch as the commissioners draw no salary, *The Times* is of the opinion that they should at least be made to feel that in a measure their reward lies in public appreciation of the value of their services. They are engaged in a large and important work, and the intelligent and faithful performance of their duties will prove of immense value to the state."

OBTAIN AN AUTHORITATIVE WORK ON PHEASANT BREEDING FREE.

Through the courtesy of the American Game Protective Association we are enabled to offer free of charge to game breeders in this state a limited number of copies of E. A. Quarles' authoritative work "American Pheasant Breeding and Shooting." Everyone engaged in pheasant breeding and everyone who contemplates rearing these birds should possess a copy of this book. Make application to Bureau of Education, Publicity and Research, Museum of Vertebrate Zoology, Berkeley, Cal., and include six cents in stamps to cover postage.

GAME BIRDS FOR SALE.

The stock of game birds at present held on the State Game Farm at Hayward will be sold at reasonable prices to game breeders. The species represented are: ring-necked, golden and silver pheasants and valley quail. Ducks of the following species are also offered: mallard, pintail, spoon-bill, cinnamon teal, green-winged teal and fulvous tree-ducks. Apply to Superintendent, State Game Farm, Hayward, Cal., for prices.

HATCHERY NOTES.

W. H. SHEBLEY, Editor.

COMPLETION OF HATCHERY OPERATIONS FOR THE SEASON 1916.

On November 7, the fish distribution car left Sisson with the last shipment of trout fry for southern California, and this completed the work of the hatcheries for the season of 1916. While the total number of trout fry distributed during the season of 1916 has been less than during 1915, we believe that, taken as a whole, the results have been more satisfactory. We were able to give the fish a wider distribution this season owing to the fact that we had more hatcheries in operation and were better equipped to hold and rear the fry at the smaller stations. With the improvements made at Bear Valley and Snow Mountain stations, and the construction of Fort Seward and Almanor hatcheries, our facilities for rearing and distributing trout fry have been greatly increased. With Sisson hatchery relieved of a portion of the work of hatching, rearing and distributing the fish, overcrowding of the fry in the hatching troughs was avoided to a considerable extent and as a result those distributed this season were stronger, healthier fish and reached the streams in better condition than in former years.

Improvements made in our distribution car 1, the installation of a larger and more efficient engine and air compressor in car 2 and a better system of the distribution of air in the cans on both cars have been contributing factors in the successful results obtained in fish distribution work this year.

From Sisson hatchery we distributed 1,950,000 rainbow, 1,850,000 eastern brook, 1,725,000 Loch Leven, 950,000 black-spotted, 2,800,000 steelhead and 75,000 German brown, a total of 9,350,000 trout fry.

From Tahoe hatcheries, 209,000 rainbow, 50,000 eastern brook, and 2,765,000 black-spotted, a total of 3,024,000 trout fry, were distributed.

Steelhead trout fry to the number of 490,000 were distributed from Ukiah hatchery and 184,000 steelhead fry from Snow Mountain station.

From Fort Seward hatchery there were distributed 95,000 rainbow, 132,000 black-spotted and 924,000 steelhead, a total of 1,151,000 trout fry.

From Almanor hatchery 202,000 rainbow trout fry were distributed.

From Brookdale hatchery 881,000 steelhead fry were distributed, from Bear Val-



Fig. 13. A rainbow trout, 29 $\frac{1}{2}$ inches in length. Caught by Mr. and Mrs. Frank Mason of Fresno, at Bass Lake, Madera County. Photograph by R. S. Kimball.

ley hatchery 750,000 rainbow, and from Marlett-Carson hatchery 55,000 eastern brook, making a total number distributed from all of our hatcheries of 16,087,000 trout fry.

A NEW FOOD AND GAME FISH FOR SOUTHERN CALIFORNIA COAST COUNTIES.

During the early spring of 1916 we endeavored to obtain a supply of small striped bass for the southern California coast county streams by seining in San Pablo Bay.

On May 28 a shipment of about 300 small striped bass were obtained and shipped to Senator E. S. Rigdon of Cambria, San Luis Obispo County, who liberated them in Morro Bay at the mouth of Chorro Creek. Several times through the summer months an endeavor was made to continue this work, but weather and tide conditions were not favorable and efforts were not successful. The work was again taken up during the middle of October and, as conditions were favorable at that time, a fine shipment was procured. The seining operations were carried on near Vallejo under the supervision of Deputy H. E. Foster. Deliveries were made to Senator Rigdon, who planted 600 striped bass in the mouth of San Luis Creek, at San Luis Bay, and 400 at the mouth of Corral de Piedra Creek near Pismo, in San Luis Obispo County. The Los Angeles division of the Fish and Game Commission received 2,200 striped bass, and 200 of these were liberated in Anaheim Bay and 2,000 in the lagoon at Sunset Beach, Orange County. A third consignment consisting of 1,800 striped bass was delivered to H. R. Asher, secretary of the San Diego Rod and Reel Club, and liberated in Mission Bay, San Diego County. If the results of these plantings of striped bass are successful, a new and valuable game and food fish will be added to the waters of southern California.

SCREEN AND LADDER OPERATIONS.

During the past two or three months considerable progress has been made in the installation of fish ladders. The following is a list of the ladders that have been completed, which have not been heretofore reported:

The Valdor Mining Company has completed the construction of a fishway over its dam in Canyon Creek, Trinity County.

The same company has installed a screen in its canal diverting water from Canyon Creek, Trinity County.

A fish ladder has been completed over the dam of the Northern California Power Company in Tehama County, at Inskip Ditch, below south power house.

Under the supervision of Deputy J. S. White, a fish ladder has been installed over the Butters Dam, in Big Backbone Creek, in Shasta County.

A ladder has been installed over the Ellsworth Dam in Campbell Creek. This dam is the property of Santa Clara County.

William Shaughnessy has completed the construction of a fish ladder over his dam in Sierra County, in the south branch of Middle Yuba River.

The dam of C. J. York, in Middle Yuba River, Sierra County, has been provided with a fishway.

Overflow and underflow current fish ladders are now under construction over the Mendota Weir, in San Joaquin River, Fresno County. This weir is the property of the Miller & Lux Company.

The Crown-Willamette Paper Company has commenced the construction of a new fish ladder over the Floriston Dam, in Truckee River, Nevada County.

A fish ladder is being installed over the dam of the Anderson Irrigation Project, in Sacramento River, Shasta County.

From recent reports received from Santa Clara County, we find that screens have been installed in irrigation ditches of J. W. Dickson, diverting water from Penitencia Creek; M. D. Knoble of Berryessa; P. Mason of San Jose; G. W. Page, diverting water from Campbell Creek; Sorosis Fruit Company, Campbell Creek; and La Hoydie Irrigation Company, Campbell Creek.

Two new screens have been installed by the Trinity Gold Mining and Reduction Company, in Trinity County. The Western States Gas and Electric and the La Grange Company have screens ready for installation in their ditches in Trinity County as soon as the water is turned in next spring.

A screen has also been installed in a ditch diverting water from the east fork of Stewart's Fork of Trinity River, Trinity County, by Mrs. A. Baudrey.

The California-Oregon Power Company is planning to install a large screen of special construction in its canal diverting water from Shasta River, Siskiyou County.

of the north coast counties well stocked, and it is our intention to also propagate enough salmon fry to keep up the supply of this valuable commercial fish in Eel River.

Work has been completed for the season on Almanor hatchery located at Lake Almanor, Plumas County. A hatchery building 22 feet by 40 feet, equipped with



Fig. 14. A "shad battery" at Yuba City hatchery. The photograph clearly shows the manner in which shad eggs are hatched.

PREPARATIONS FOR NEXT SEASON'S HATCHERY OPERATIONS.

The construction of Fort Seward hatchery, Humboldt County, is nearly completed and we expect to have the station in first-class shape for salmon hatching operations this season.

Improvements have been made in the hatchery building by the installation of new hatching troughs. The hatching troughs and the building inside and out have been painted. The superintendent's residence has been completed and additions to living quarters for assistants have been made.

Fort Seward hatchery will be well equipped for handling both salmon and trout. We will be able to rear enough trout at this station to keep the streams

sixteen hatching boxes and all necessary paraphernalia for operating the hatchery next season, and comfortable living quarters for the employees have been constructed. A large fish-holding tank, fish racks, flume and trap have been built and stored ready for installation as soon as operations are commenced in the spring. The work was finished on November 17.

A small eyeing station consisting of ten hatching troughs has been installed at Domingo Springs.

A large fish-holding tank, racks, flume, trap, etc., have been built and tools and egg collecting apparatus are stored at Rice Creek Spawning Station, near Domingo Springs, ready for installation as soon as operations are commenced. The necessary tent, cook stove and complete

camp equipment have also been stored at Rice Creek station and Domingo Springs.

During the latter part of September the construction of the Rae Lakes egg collecting station was completed. Materials, supplies, tools, etc., were taken to the lake over the Oak Creek Pass and stored in a firmly constructed galvanized iron building 8 feet by 14 feet, which was built during the summer. A supply of provisions was also cached to be used by the assistants next spring when they make the trip in to commence the egg collecting work. Rack and trap material was also taken into the station and preparations made for installing the paraphernalia

On October 1, operations were commenced in an endeavor to obtain a supply of eastern brook trout eggs from Marlett Lake, Nevada. The California Fish and Game Commission and the Nevada State Fish Commission entered into an agreement to cooperate in the work and divide the eggs secured equally between the two commissions. The eggs are taken from tributaries of Marlett Lake, near the lake shore and from Hobart Creek at Red House and transported by teams to Verdi hatchery, where they are eyed and prepared for shipment to Sisson hatchery. Heavy rain and snow storms set in, however, and it was not until October 12



Fig. 15. The McCloud River station of the United States Bureau of Fisheries. It is here that most of the salmon eggs are secured for stocking the streams of California.

when egg collecting operations are commenced. It was necessary that absolutely every article for the operation of the station, as well as camp equipment and food for the men engaged in the work, be foreseen and taken in during the summer, as the assistants will have to go into the station next spring over the Oak Creek Pass, via Diamond Peak, the highest point of which is over 12,000 feet, and will be able to pack only their blankets with them.

The rainbow trout eggs taken at Rae Lakes station will be hatched and reared at the new hatchery now under construction on Oak Creek, Inyo County, from which point they will be distributed in the streams of southern California.

that our assistants were able to leave Carson City, Nevada, on the trip into Marlett Lake. On account of the heavy fall of snow, which was from one to three feet deep, they were unable to get farther than Red House. Temporary camp was made at this place and on the fifteenth the crew went on to the lake on snowshoes. Marlett Lake was found to be covered with a thin coat of ice. As no fish were running, due to the heavy storms and cold weather, the crew returned to Red House, where a few trout were running in Hobart Creek, and where racks and trap had been installed. On the seventeenth, camp was moved to Marlett Lake and racks installed in the largest stream flowing into the lake. The run of

spawning fish soon started, but owing to the continuance of the storm and extremely cold weather, the runs at both Marlett Lake and Hobart Creek have been very light and it is improbable that the take of eggs will be large. Up to December 1, 1916, 569,000 eggs had been secured.

MOUNT WHITNEY HATCHERY.

Mount Whitney hatchery, located on Oak Creek, four and a half miles from Independence, the thriving county seat of

of modern hatcheries and batteries that will make up this station when the whole plan is finished.

The ample supply of pure water in Oak Creek that gushes from the granite rocks of the basal slopes of the Whitney range is sufficient to furnish this plant with all the water necessary for its development for a quarter of a century.

An almost unlimited supply of eggs can be obtained from the Rae Lakes, if fishing is prohibited in these waters. To insure a supply of rainbow trout eggs for



Fig. 16. Screen installed in the canal of the Northern California Power Company on the Colman Ditch from Battle Creek, Tehama County, California. The screen wheel is ten feet in diameter and the water seven feet deep. Photograph by A. E. Culver.

Inyo County, is nearing completion. This beautiful structure, when completed, will be the most modern and up-to-date hatchery in the world. It is constructed of granite and gabro, and the coloring of the rubble walls blending harmoniously into the background of giant peaks that form the west wall of the valley leaves an impression that will long be remembered. The work of the Department of Engineering on this structure will be completed about January 1, 1917. The hatchery equipment and apparatus necessary to handle the millions of eggs that are to be hatched at this station in the near future will be made by the employees of the hatchery department. The building is 200 feet long by 45 feet wide, and has a hatchery capacity of 6,000,000 eggs. This building is the first unit of a series

all time, the Rae Lakes basin should be set aside as a state fish preserve during the coming session of the legislature. This can be done by creating a fish and game district of the basin in which the lakes are situated and prohibiting fishing in the district set aside as a preserve. This is necessary to insure a supply of eggs for this new station. When the new trail is completed to the lakes, hundreds of anglers will rush there to enjoy the wonderful fishing that these lakes afford. There are thousands of rainbow trout in these lakes, but to furnish eggs sufficient for a station of the size of the Mount Whitney hatchery, it will be necessary to conserve these fish for spawning purposes.

The importance of Mount Whitney hatchery is best understood when it is realized that the whole of the state south



Fig. 17. A view of one of the Rae lakes. Eggs for the new Mount Whitney hatchery will be secured here.

of the Tehachapi Mountains and as far north as the Yosemite Valley will receive its annual supply of rainbow trout fry from this hatchery. Mount Whitney hatchery is not built for a day or a decade, but is planned for the coming years, as California's fame as an anglers' paradise grows. It will be able to keep stocked those streams depleted by the increasing demands made upon them as the population increases.

COMMERCIAL FISHERY NOTES.

N. B. SCOFIELD, Editor.

THE 1916 TUNA PACK.

The 1916 tuna pack for California will exceed that of last year or of any preceding year, but with all that the year has been a disappointing one for the canners. With a strong demand for all the tuna they could put in cans, nearly all of the packers had improved or enlarged their plants, and more fishermen were employed with the intention of doubling their output if possible. Even with the incentive of a higher price the fishermen were able to take but few more fish than last year. Although the pack is a little larger this year it is certain that the fish were not nearly so plentiful. We will always be uncertain as to what the tuna catch will be, for it is a pelagic fish and its feeding ground and possibly its place of spawning shifts with the shifting currents.

Last year large albacore (tuna) were found to be plentiful far out in the open

sea fifty to seventy miles southwest of San Clemente Island. On account of the great distance from the canneries it was unprofitable to go after them with the small boats now employed. This year a few larger fishing boats were built with the idea of going after these large fish, but they did not succeed in locating them.

Some of the more successful Japanese fishermen who have prospected in these off-shore regions believe that fishing "banks" will be found where albacore may be taken the year round. They also believe that the "run" of albacore is not so much a movement up the coast as it is a movement toward the coast from these off-shore banks.

There are a number of reasons for this belief. The fishermen have been unable to follow schools in any extensive movement up the coast. The fish usually appear first well off shore and later move closer in. A school of exceptionally large

albacore will appear at one place and will not be taken later either to the north or to the south. In 1914 a school of very small albacore averaging four and one-half pounds in weight appeared off San Pedro. These fish were not traced either to the north or to the south of this place.

It has been demonstrated that such fish as the herring and sardine of Europe do not migrate up and down the coast as formerly supposed, but that the movement is shoreward from the open sea, and that while the herring are all of one species, each locality has a race of herring that in quality or size is peculiar to and constant in that locality. If there was a general movement along the coast the character of the fish in the different places along the coast would not be constant. The herring on our Pacific coast shows this same race difference in different localities, and it is barely possible that the albacore may be found to exhibit these race differences at different localities along our California coast.

It is of interest to know that the young of the albacore have never been observed. To our knowledge, the smallest albacore captured in California weighed three pounds. No albacore with noticeably developed spawn have been taken by any of the cannery fishermen. The ovaries and spermaries of the fish usually show no development at all and it is only rarely that one with even immature spawn is observed. The largest albacore so far recorded weighed seventy-six pounds. This

one, with several others nearly as large, was taken near San Pedro during the last week of October, 1916.

There were 397 fishing boats employed in the tuna fishery this year, each boat being manned by a crew of three. Half of the tuna fishermen are Japanese and this one-half catches 85 per cent of the fish.

A YELLOW-FINNED ALBACORE FROM THE MEXICAN COAST.

A fish sent to us for identification from near Mazatlan, Mexico, has been pronounced by Dr. C. H. Gilbert the yellow-finned albacore, the albacore most common in Japan and usually called the Japanese albacore. It is found in the Hawaiian Islands and a few individuals have been taken in southern California by the fishermen while fishing for the long-finned albacore or tuna. It is reported that these fish are plentiful near Mazatlan.

MUSSELS GROW RAPIDLY.

In investigating the rate of growth of some of the sea animals in Monterey Bay, Dr. Harold Heath, Department of Zoology, Stanford University, found that the sea mussel (*Mytilus californianus*) grows from the egg to a length of three and one-half inches in one year. He found also that both the acorn and goose barnacles reach sexual maturity at the age of eighty days.



Fig. 18. Fisherman's Wharf, San Francisco. Photograph by H. H. Hunt, April 12, 1916.

A COMMERCIAL FISHERIES TAX BILL.

The Fish and Game Commission has prepared a bill, to be introduced at the next session of the legislature, which is designed to increase the revenue of the commission that it may better carry on its commercial fisheries work.

Since the legislative session of 1909, the Fish and Game Commission has received no appropriation from the state, as the revenue derived through the hunting, angling and commercial fishing licenses was deemed sufficient for all the needs of the commission. But with these funds the game patrol service has been greatly extended, the commission's activities have been increased and the output of trout from the hatcheries has been so enlarged to meet the ever-increasing demand for stocking the streams that the revenue derived from the hunting and angling licenses is all needed for these purposes. There is left then for the commercial fisheries the revenue derived from the commercial fishing licenses and the wholesale fish dealers licenses, which together amount to less than \$35,000 per year. This amount is entirely inadequate to carry on an effective fisheries patrol; to propagate commercial fishes; to carry on the investigation work so necessary for the conservation of our fisheries; and to pay the fishery's proportionate share of the executive expense of the commission.

In supplying the revenue for the support of the commission, each activity under its jurisdiction should bear its proportionate share. As already stated, the commercial fisheries are not furnishing their proportionate share at the present time, and in the future expansion of the fisheries, which is already upon us, they will fall short still more.

Within the last few years our fishing industries, especially those carried on in the open sea, such as the tuna, halibut, sardine and trawl fisheries, have developed enormously. There is now a very

great need of a better fisheries patrol and of a thorough investigation of the commercial fishes if we are to conserve these industries with intelligence. Some of our fisheries are bound to be developed, even without state aid, faster than we can gain the necessary knowledge for their conservation. The people will learn to eat species of fish that are now little used. Our fish are gradually being sent to more distant markets. The eastern United States is now drawing heavily on our salmon, shad, tuna and sardines, and is bound to draw more heavily on these and others of our fishes in the future. The great increase in the demand for all kinds of canned fish is another feature we must recognize if the fisheries are to be successfully regulated in the future. Our most important problem is how to get the most out of our fisheries without injuring the source of supply. In other words, to use the interest without drawing on the principal.

Our fisheries can be adequately conserved only when we have learned the life histories of the different market fishes; when we have learned the effect of the fishing methods in vogue, and when we know how much each fishery will yield without injuring the supply. This knowledge must be applied by framing such protective laws as may be necessary; by enforcing these laws by an adequate patrol service, and by aiding species by artificial propagation where that method is feasible. These are necessary steps that should be completed as soon as possible. They are steps that should be well provided for by the state before a campaign is started to further develop the fisheries. To use a revenue from the fisheries at this time for any but these purposes would be a serious mistake, and any reasonable revenue which they will yield will all be needed to carry on the conservation work now being conducted by the Fish and Game Commission.

CONSERVATION IN OTHER STATES.

PENNSYLVANIA ATTEMPTS TO RESTOCK THE STATE WITH RABBITS.

The attempt has been made by the Pennsylvania Fish and Game Commission to purchase thousands of rabbits from other states to be used in restocking. Although promised carloads of rabbits from Kentucky, none was secured because those who caught the animals put them in a box or enclosure together, with a result that but one rabbit remained the following morning, it having killed the others. An offer of thirty cents apiece f. o. b. at their shipping point also failed to secure rabbits from localities where they were said to be so abundant as to be a nuisance. Instead of tens of thousands of rabbits which it was planned to secure only about 2,500 have been obtained.

Efforts to secure quail have also failed because of the inability to purchase them at reasonable prices.

ANGLERS IN MICHIGAN WORRIED.

Anglers in Michigan are worried over the statement by Dwight Lydell, superintendent of one of the state fish hatcheries, to the effect that although more fish were planted this year than ever before, yet the lakes and streams of Michigan are in serious danger of being devastated of fish.

He says: "Fishing seems to be drawing more people every year and the popular varieties of fish are being removed faster than we can plant them with the small appropriation of \$80,000 allowed us by the state legislature." Approximately 90,000,000 fish were planted in Michigan this year, as follows: Trout, 6,000,000; perch, 50,000,000; blue gills, 1,000,000; bass, 3,500,000; wall-eyed pike, 25,000,000.

MINNESOTA COMMISSION MAKES USE OF MOVIES.

The Minnesota Game and Fish Department has prepared moving picture films illustrating the artificial propagation of different varieties of Minnesota fish. Films of commercial fishing scenes and bird and animal life also are being prepared. These will be loaned, on application, to responsible organizations, and talks in explanation of the pictures will be given by the commission or the superintendent of fisheries wherever possible.

BUTTON LAW FOR HUNTERS IN NEW YORK STATE.

A new New York game law, among other regulations, provides that all licensed hunters must wear, conspicuously displayed, a button, at least two inches in diameter, to be furnished by the state. In other words, the hunting license must be kept in plain sight.

LIFE HISTORY NOTES.

THE SNOWY OWL AGAIN INVADES CALIFORNIA.

It is a well-known fact that the snowy owl (*Nyctea nyctea*) is of erratic occurrence in eastern states. It now appears that this bird occurs periodically in this state also. Just twenty years ago (1896) a number of snowy owls invaded the northern part of California. Specimens were taken as far south as Bay Farm Island, Alameda County (Cohen in Condor 3, p. 185) and Santa Cruz County (Thompson in Condor 3, p. 141).

During the same year snowy owls were reported as numerous in the state of Washington (Bowles in Osprey 1, p. 81). According to H. G. Smith (Nidologist 3, p. 76) snowy owls were taken in the state of Colorado in 1886.

The following additional data on the occurrence of the snowy owl in California

in 1896 has been furnished by H. S. Prescott of Crescent City, Del Norte County:

Ely Charter of Crescent City, Del Norte County, secured two or more specimens, in 1896. One of these was mounted and for many years was in the possession of Mr. Jeffrey, the keeper of the Crescent City lighthouse. H. J. Lattin, residing near Arcata, also saw a number of these birds in that year.

In November, 1916, a male specimen of a snowy owl, secured by Florence F. Williams on the ocean beach near the outlet of Talowa Lake, Del Norte County, was sent us by H. S. Prescott. A second specimen, a female, was secured by Mr. Prescott on November 25 between the north end of Lake Earl and the mouth of Smith River, Del Norte County. Along with this bird was a report to the effect

that Ely Charter had seen nine snowy owls between Point St. George and the mouth of Talowa Lake. Two other specimens are noted as having been taken in the county in a newspaper item appearing in the Humboldt *Times* under date of November 23. Several applications for permits to hold birds in captivity have since been sent to the Fish and Game Commission by parties in the same vicinity who have secured snowy owls alive.

On November 18, through the kindness of George Neale of the Sacramento Division of the State Fish and Game Commission, we received another snowy owl, secured by Edward Bolt of Gridley, Butte County. The stomach of this bird contained parts of a mudhen.

The above is sufficient evidence to show that snowy owls have again made their appearance in California, probably for the first time since 1896. All three of the above specimens have found a place in the Museum of Vertebrate Zoology, where they will be of permanent value to the state.—H. C. BRYANT.

DUCKS ARRIVE EARLY.

Ducks arrived very early this season. Several canvasbacks were seen on San Pablo Bay August 20, 1916. Pintails were unusually abundant at this time of year, and a few bluebills were also seen. Deputy Hoen reported to me that canvasbacks were seen on Tomales Bay during the latter part of August.—H. E. FOSTER.

ONLY A FEW DUCKS DIE AT TULARE LAKE.

The fact that but few ducks have died this fall on Tulare Lake has again upset the theories regarding the peculiar malady which periodically has affected the waterfowl on this lake. If the water of the lake is responsible for the disease it seems strange that last year when the lake was the driest it has been for some time, only a few birds were found dead. This year, with an abundance of fresh water and the lake 16 to 18 miles across, larger than it has been in years, no serious outbreak of the disease has occurred. On the other hand, in 1910 when the Kings River ran into the lake from the middle of March until the middle of October and the lake was even larger than at present, the largest death toll of any year resulted. It is to be hoped that the decrease in the number of affected birds noted during the past two years will continue and that the trouble is mainly over.—E. W. SMALLEY.

DUCK DISEASE.

The only place where duck disease has appeared in the Lower San Joaquin Valley this fall (1916) is on a small lake, formed by the overflow from Bull's Slough, on the northern border of Kern County. The lake is located just north of the old Fowler House, a landmark of the country, and is about one mile wide and three and one-half miles long. On the banks along the border of the lake I estimated there were fifty dead ducks to every one hundred feet. When visiting this section on the 21st day of July, 1916, no birds were found. Apparently, therefore, the ducks began dying some time during August.—TIPTON MATHEWS.

GAMBEL QUAIL TRANSPLANTED.

Two dozen Gambel quail (*Lophortyx gambeli*), obtained from Mr. Kenneth Hayward of Thermal, Riverside County, were liberated on Mount Rubidoux, near Riverside, the last of September. The birds were obtained under permit from the Fish and Game Commission. The transplantation was made in the hope that these desert quail would increase and add interest to Mount Rubidoux. The birds will be carefully protected and fed regularly.—J. S. LOGAN.

UNUSUAL DUCKS VISIT INTERIOR.

Several species of winter visitant ducks, which formerly were seen commonly in northern California and which are now practically unknown or unrecognized by the younger generation of waterfowl shooters, have been observed this season. Ducks of several different species have been brought to the Sacramento office of the Fish and Game Commission for identification. Three are of particular interest: the lesser scaup, or "bluebill," which, twenty-five years ago, frequented the unreclaimed islands of the lower Sacramento; the American goldeneye, and the beautiful bufflehead or "butterball." The goldeneye has even appeared in the markets in Sacramento this year. The wood duck, which nested in large numbers in the timber bordering the banks of many sloughs and rivers of central and northern California, also has been unusually common this winter.

The presence of these ducks augurs well for the future. The present federal and state laws may be responsible for the return of these species. Certain it is that it has been many years since these ducks

have been seen in any numbers in this section.

Quite a number of wood ducks were seen on the opening day of the season and several were killed. Unfortunately, a duck is simply a duck to most shooters, who do not know or care what species of ducks and other waterfowl are protected at all times. Such shooters kill the bird only to learn later that it is unlawful to shoot the same. We have seen a perfectly honorable law-abiding sportsman kill a swan, supposing it to be a goose, and kill wood ducks for teal or other ducks. There is nothing more interesting to the true sportsman than knowing the species, even to the sex thereof, before shooting. No two species fly alike. Every species of duck has its peculiar mode of locomotion. Some use a slow motion of wing, some very fast, as do the quail. The short-winged ducks, such as the teal, goldeneye and ruddy, are not only recognized by their rapid flight but by a peculiar motion all their own that can not be explained or described, but which can not be forgotten when once learned. The movements of birds should be observed closely by the hunter, so that he may tell at a glance what species he is about to kill. The wood duck (which is protected all the year) is one of the easiest of ducks to distinguish, both by flight and plumage. This duck, especially the female, appears

to have small spectacle rims on each side of the head, a mark very plainly discernible. Both have plumes on the crown, the male plume being larger than that of the female. The female, when flying, invariably has a peculiar cry as though it were in pain.

More study of the bird and less thought of how many birds one can kill will prove interesting, and, furthermore, will mean the saving of some of the species from extinction. If hunters persist in shooting everything, irrespective of kind, arrest and severe punishment will be used to compel them to have more care.—GEORGE NEALE.

THE MOUNTAIN LION AN ENEMY OF THE SKUNK.

The following evidence bears on the food habits of the mountain lion. Evidently lions do not confine their attention wholly to deer.

On November 8, 1916, our shepherd dog treed a young California lion a short distance below our ranch, near Coulterville, Mariposa County, California. My father, on approaching the lion, which had taken refuge in a live oak tree, noted an odor of skunk. After the lion had been killed the stomach was found to contain a half-chewed skunk, a striped one, judging from the black and white hair found. The lion was only a small one, weighing in the neighborhood of thirty-five pounds.—DONALD D. McLEAN.

UNITED STATES FOREST SERVICE COOPERATION.

L. H. WHITEMAN, Editor.

QUAIL BECOMING SCARCER IN THE STANISLAUS NATIONAL FOREST.

Mountain and valley quail are getting scarce, valley quail being found in large numbers only in the southern portion of the Stanislaus National Forest. This is probably due to the increased number of hunters who go into the forest each year, and to the use of modern firearms. Also it is a well known fact that hawks get away with a large number of birds, especially in the high country. It is believed here that the mountain quail law should open with that for valley quail, since in some districts the young birds are hardly able to fly on September 1, when the present season opens.—E. D. BACH.

DEER IN THE EL DORADO NATIONAL FOREST.

Forest officers reported 128 deer killed during the 1915 open season within the El Dorado National Forest, and five without the forest, or a total of 133 reported by forest officers who are deputy fish and game commissioners. This number does not equal the number killed during the open season of 1914, which is a strong argument that deer are decreasing in number, and there were many more hunters in the mountains this season than during 1914. A rapid increase in the number of hunters may be expected in the future for the reason that the automobile furnishes rapid transportation to

and from the valley towns. It is recommended, therefore, that deer be further protected by allowing only one buck per man per season, and if in one or two years a slight increase in the number of deer is not seen, a closed season for at least three years should be enacted.—E. L. SCOTT.

EFFECT OF FOREST FIRES ON FISH.

In the summer of 1915 a very severe brush fire burned off all the brush cover along the headwaters of Tepusquet Creek in the Santa Barbara National Forest. Tepusquet Creek had good fishing in it before the rains came, but the rains that winter poured tons of dirt and ashes off the burned mountain sides into the creek, gullying the slopes badly. The fish holes were all filled up. The dirt and ashes evidently killed every one of the fish. Now the stream has not a fish in it, or any holes for them to live in during the summer if there were any alive.—J. R. HALL.

FOREST OFFICERS DESTROY PREDATORY ANIMALS.

More proof of the value of forest officers as protectors of game is found in a recent report from the Sequoia National Forest which states that two bears, thirty coyotes and five wildcats have been killed during the past year by forest officers.

THE SPIKED BUCK LAW.

The spiked buck law comes in for a good deal of comment from rangers of

the Santa Barbara National Forest, as follows:

The spiked buck law is a good one: First, because the bucks are getting very scarce; second, because it causes the hunter to look closer at the deer before shooting, therefore preventing the killing of many does for lack of close observation.—RANGER S. H. DOUGLAS.

The spiked buck law is a good thing in the right direction, and I believe has been universally observed; in fact, there have been very few reports of violations and in every case except one I have reason to doubt the truth of the reports, and I have investigated every report reaching me. The reported violations proved to be some one's suspicions. The presence of plenty of does and fawns and spiked bucks throughout the district is evidence of the integrity of the great majority of the hunters who have been in the field.

I have found a growing sentiment during the 'last several years' in favor of a closed season of from three to five years in length and then a reduction of the buck limit—one buck and the season shortened anywhere down to one day. The sentiment in favor of a closed season has crystallized until I have heard almost every hunter that I have met this season make some such expression.—RANGER H. H. HUNT.

My idea of the spiked buck law is that it is all O. K.; saves more does than any law ever passed. The opening and closing of the season could not be better. The trout season is all right just as it is and the quail season also.—RANGER S. J. RHYNE.

BOY SCOUT COOPERATION.

NEW YORK SCOUTS TOLD HOW TO CONSERVE WILD LIFE.

[The following is the advice given the boy scouts of New York State by John B. Burnham, president of the American Game Protective Association. Scouts of California! Can't you make use of some of these ideas? What birds mentioned by Mr. Burnham are not found in California? Honorable mention will be given the California scout who sends in a correct list.—EDITOR.]

CONSERVATION AND WILD LIFE.

Conservation is preservation. It is founded on frugality and unselfishness. As applied to game and forests it does not

mean that game shall not be killed nor trees cut down when needed for use, but it does mean that there shall be no wanton destruction and no unnecessary waste.

Only useful things must be taken as required, and then only when not in conflict with the right of others. Beautiful objects in nature must be spared and protected. Birch trees must not be marred by peeling the bark. Shrubs and trees must not be hacked and defaced. Names or signs must not be chiseled on rocks. Above all, beautiful and useful birds and mammals, not classed as game, must be protected with

the same spirit with which we protect our own good names.

Our natural resources are given us "in trust, for the benefit both of the present and the future. We must render an accounting of the trust to those who come after us!"

CERTAIN CARDINAL PRINCIPLES.

1. Way back in Deuteronomy we are told not to molest a bird on the nest. This is the earliest game law and the most fundamental. All creatures must be protected during the period of rearing their young. Otherwise extermination will result.

2. Do not let anybody rob bird nests. Protect the immature things from predatory creatures. If you have a cat which kills birds, put a bell on its neck and do not let it roam the fields, particularly in the nesting season.

3. Do not be a game or fish hog, and do not let others take more than a reasonable or legal limit. Sometimes the legal limits are too large, and sometimes there are no legal limits imposed. Here your moral powers should be exercised to prevent excess. Supplant the fallacy that nothing succeeds like success with the finer principle of sport for sport's sake. Taking game and fish with gun and rod in moderation is manly sport, but it is still finer to study the wild things and to secure as trophies photographs which are tokens of greater skill in woodcraft.

4. It is now illegal to sell almost every kind of game in almost every state in the Union. New York prohibits the sale of all game except rabbits and certain propagated and imported species. The market hunter is thus eliminated, but in some places game is still illegally sold by resort to subterfuge.

5. You can do much to preserve the game and birds by providing cover for them and food. Plant barren tracts with trees which can be procured from the Conservation Commission for three or four dollars a thousand. Plant also barberries and haws and other food-bearing shrubs which can be procured at small cost from commercial nurseries, or plant even cherry stones and apple seeds and willow suckers. You will have the satisfaction of seeing something grow where

nothing grew before, and the knowledge that you have done something of value to posterity.

6. Many birds and animals die in cold weather from temporary causes. Often they need only a trifle of food to supply their needs till the snow settles, or the ice melts from seed-bearing weeds and shrubs. Here much good can be done by distributing suitable grains or other food in the swamps or other places in which wild life resorts. Read "Wild Bird Guests" and other books which give information on this subject.

7. Know the game laws. Remember that all wild birds in the state are protected at all times, together with their eggs and nests, except English sparrows, starlings, crows, hawks, crow blackbirds, snow-owls, great-horned owls and kingfishers, and the game birds.

The birds classed as game are limited in number in this state and it is an easy matter to learn the list. They are the waterfowl, including geese, brant and river and sea ducks; the marsh birds, including rails, coots, mudhens, and gallinules; the upland game birds, including grouse or partridge, pheasants and quail; and the shore birds, such as woodcock, snipe and plover. Knowing the birds which may be killed, it is easy to be sure of those which may not be killed and, thus informed, to prevent others from taking the lives of those cheery and useful friends of humanity. To know when game birds are being killed illegally, however, it will be necessary to study the state closed seasons.

A SAMPLE OF THE WORK OF ONE SCOUT.

[Here is a sample of the interest taken by one Scout. Scout Marriott is out after that prize and the rest of you will have to hurry.—EDITOR.]

SANTA MARIA, CALIFORNIA,
October 26, 1916.

State Fish and Game Commission of California.

DEAR SIR: In regard to your game magazine, of which we received a copy, I notice it speaks chiefly about deer and I will tell you a few more things we find to be true.

One reason why our deer are lessening in number is because some of our citizens

kill deer before the season opens, kill does and fawns whenever no one is around that they know of and many kill more than two a season. This can easily be done, we find, by the hunter killing one, then after that is gone and if he has not been noticed by some ranger or game warden, he will throw the horns and skin away and go after his two deer which he says he has a right to kill. This is often used, I fear, and something should be done to stop it.

Another solid reason why our deer are few in numbers is because of the puma or mountain lion, which preys upon the deer. These beasts, I and many others find, kill on an average of ten per year, and a bounty of about \$100 ought to be paid for the skin of a lion. There is only one good thing that the puma is good for and that is his fur; therefore, it would do no harm if they were entirely exterminated.

Yours truly,

(Signed) PAUL MARRIOTT.

SANTA MARIA, CALIFORNIA,
September 4, 1916.

*State Fish and Game Commission,
Los Angeles, California.*

To whom it may concern:

On your game laws (1915-1917), I find you have the dove season opening on September first.

This opening season date for doves I find does not give the parent birds time enough to hatch their young.

A week ago I was on a little hike by myself. I discovered three dove nests, one with eggs and the other two with baby doves about a week old in them. As this is a fine dove country there must be many more nests with the same aged occupants.

Yours truly,

PAUL MARRIOTT.

Tenderfoot Scout, Troop 1.

SANTA MARIA, CALIFORNIA.
October —, 1916.

*State Fish and Game Commission
of California.*

To whom it may concern:

In regard to the English sparrow or European house bird I find that in this district the bird nests from four to seven times a year and usually has from four to six eggs.

Its nest is very poorly constructed, and as it builds in some corner, nook or ornamental fixtures, it not only spoils the appearance of the building but has often caused fires.

In the fruit counties this bird nips the buds in spring, kills young birds of the song variety and fills air with its non-musical chirp. There seems to be only one bird that can hold its own with the English sparrow and that is the blackbird.

We have great difficulty in planting lawns here because as soon as the seeds are sown the pests arrive and they soon leave patches of bare ground.

I have built a nest box in my yard and the best way I find to exterminate them is to let them nest, then one by one break up the eggs. In this way the birds soon leave the nest and the box is soon filled by another couple which by the same way may be gotten rid of. Instead of taking them all at one time the parent birds can be caught and killed and the eggs also destroyed.

I have killed fourteen English sparrows since the troop received your letter.

If there is some better way of getting rid of them or anything else I can do for the Fish and Game Commission please let me know as I would like very much to have the honor of getting a pair of pheasants.

Yours truly,

PAUL MARRIOTT.

Tenderfoot Scout, Troop 1.

REPORTS.

CALIFORNIA FISHERY PRODUCTS FOR THREE MONTHS ENDING JUNE 30, 1916.

Species of fish	Del Norte, Humboldt.	Mendocino, Sonoma, Lake.	Marin.	Sacramento, San Joaquin.	Alameda, Contra Costa.	Solano, Yolo.	San Francisco, San Mateo.	Santa Cruz.	Monterey.	San Luis Obispo, Santa Bar- bara, Ventura.	Los Angeles.	Orange.	San Diego.	Other counties..	Mexico.	Total.
Albacore			98,775		825		2,771		21,780		404,653		1,335			405,983
Anchovy								347			3,443					133,594
Barracuda										56,900	717,431	13,337	306,003		164,059	1,229,380
Bonito							4,331		47,493							
Bocaccio																
Bluefish									17,581							51,824
Chilepepper																17,581
Carp			2,915	4,454	20,357	30,750	36,036							1,748		96,260
Crabfish		3,077			35,190	15,347								595		54,139
Coalfish									1,771							1,771
Cuttus cod							35,385	40,068								75,483
Dogfish							95,896	91	9,722							9,722
Filcunder	2,204				14,646	962		6,737	6,066	15,000	586,859	14,068	13,673			113,799
Hailbut	4,035		127				1,278	450	146		140					916,376
Hake							35,446	870	41,293		3,229					36,182
Herring			628,427		1,575		7,106	59,090			95,072	262	2,533		525	632,490
Kingsfish							26,760				182,104				184,213	
Mackerel									683						970	183,657
Mullet																
Pike				1,391	329											
Pompano							246	1,167	117		5,797	155		105		1,825
Perch	1,650		\$ 759		948		2,630	3,587	6,336		2,370					7,482
Rock bass		833									64,537	12,278	161,232		260	26,480
Rockfish	1,660		29,834				103,437	22,602	200,770	6,805	298,891	4,886	235,132		34,970	273,850
Sole							454,835	406,287	7,972		1,969		485		39,509	943,646
Salmon	8,776	1,200	118	150,742	264,250	370,659	1,084	81,052	3,323,837		55				225	901,773
Sea bass (white).	11,486		8,904	Smelt	2,348		125,972	10,761	35,036	16,580	39,615	2,353	5,991		340	4,217,988
Sea bass (black).			167							6,971	63,306	146	7,234		10,577	259,386
Sand dab								104	250		5,153				3,525	16,314
Striped bass			429				213,084	155,600	1,296		5,837	28				375,365
Shad				32,797	88,717	61,421		222						128		268,244
				86,669	2,896,418	809,125	94,147	63						10,760		3,397,137

CALIFORNIA FISHERY PRODUCTS FOR THREE MONTHS ENDING JUNE 30, 1916—Continued.

Species of fish	Del Norte, Humboldt	Mendocino, Sonoma, Lake	Marin	Sacramento, San Joaquin	Alameda, Contra Costa	Solano, Yolo	San Francisco, San Mateo	Santa Cruz	Monterey	San Luis Obispo Santa Bar- bara, Ventura	Los Angeles	Orange	San Diego	Other counties	Mexico	Total
Sturgeon	120			1,390	1,988	728	100	202	231,968		17,530		136,667	179		4,505
Sardine	45						1,138								145	387,755
Skate							25,927					253	75			26,285
Sculpin								70			1,029	172				1,271
Sea trout											588	10				548
Tom cod							5,115									5,115
Trout (lake)													1,610			1,610
Turbot		35	21													21
Whitebait			6,745				53,547									60,327
Yellowtail		400														303,906
Miscellaneous	5,243		273,450	491	275		10,431	298	6,509		268,076	22,961	27,554	18	8,055	321,325
Total fish	35,219	5,545	1,058,775	277,934	3,327,860	1,288,992	1,452,195	780,653	3,967,506	102,256	2,796,376	48,635	909,241	28,728	534,663	16,613,573
Crustaceans																
Crab (dozen)	2,354						6,127	6,100	968							15,549
Spiny lobster																160,535
Shrimp							99,267									99,267
Ecrevisse		1,740														1,740
Mollusks—																
Squid									59,127		5,482					64,609
Cuttlefish							237	6,102	1,822							7,861
Clam (Pismo)								3,693		41,853						45,546
Clam (cockle)		574								395	3,976	1,556				32,040
Clam (softshell)		5,382					7,144									227,737
Clam (mixed)	6,200	1,095	1,624						60		1,468					11,122
Oyster (shell, No.							2,474,355									2,474,355
Abalones		4,130						1,201	180,764	104,334						350,429
Mussels		85	397				367		186	1,283	5,880					8,193
California oysters			5,345													5,345

N.B.—The figures denote pounds, except where otherwise stated. Salmon, codfish, and whale products from distant waters, brought in by boats operating out of California ports, while rightly belonging to California fishing products, are not included in the table.

CALIFORNIA FISHERY PRODUCTS FOR THREE MONTHS ENDING SEPTEMBER 30, 1916.

[illegible]

CALIFORNIA FISHERY PRODUCTS FOR THREE MONTHS ENDING SEPTEMBER 30, 1916—Continued.

Species of fish	Del Norte, Humboldt	Mendocino, Sonoma, Lake	Marin	Solano, Yolo	Sacramento, San Joaquin	Alameda, Contra Costa	San Francisco, San Mateo	Santa Cruz	Monterey	San Luis Obispo, Santa Bar- bara, Ventura	Los Angeles	Orange	San Diego	Other counties	Mexico	Total
Sardine			5,153				2,010	16,349	3,757,696	1,265	13,675		4,803			3,806,006
Skate							14,130				737					14,130
Sculpin											634					737
Sea trout							12,937									634
Tom cod																12,937
Trout (lake)														67,273		67,273
Turbot			409							235	182,532					409
Whitebait			15,196				88,759			3,569	13,066					236,742
Yellowtail																183,708
Miscellaneous	1,703	910	32,945	175	13		17,506		3,444			198		20		58,063
Total fish	185,604	5,714	173,233	480,434	214,975	785,354	1,832,959	1,167,303	5,586,099	125,360	5,697,894	33,337	3,941,324	81,200	1,006,923	21,278,689
Crustaceans—																
Crab (dozen)	547	6					2,291	763								3,609
Spiny lobster																121,265
Shrimp							127,927									127,927
Ecrevisse																492
Mollusks—																
Squid			125				108	225	109,956		105					110,519
Cuttlefish							2,713	134	121							2,968
Clam (Pismo)										51,671						51,671
Clam (cockle)			15,589								7,102					18,151
Clam (softshell)			49,708			43,973		5,855								131,551
Clam (mixed)	6,040	560	2,500			106	1,350		50							10,606
Oyster (shell), Nc.							3,294,345									3,294,345
Abalones								500	187,634	1,392						189,526
Mussels		310	165				4,409			1,242	7,120					13,246
California oysters			6,604													6,604

N.B.—The figures denote pounds, except where otherwise stated. Salmon, codfish, and whale products from distant waters, brought in by boats operating out of California ports, while rightly belonging to California fishing products, are not included in the table.

VIOLATIONS OF THE FISH AND GAME LAWS.

September 1, 1916, to November 30, 1916.

Offense	Number of arrests	Fines imposed
<i>Game.</i>		
Hunting without licenses.....	39	\$555 00
Deer, close season—killing or possession; excess bag limit one season	17	365 00
Female deer, spiked bucks, killing or possession; not retaining horns of deer; illegal deer hides.....	13	550 00
Nongame birds, killing or possession.....	17	185 00
Ducks, close season—killing or possession; excess bag limit.....	23	1,125 00
Shooting ducks from power boat in motion.....	9	75 00
Using a live or imitation animal blind.....	5	125 00
Night shooting.....	12	215 00
Geese, excess bag limit.....	1	-----
Grouse, close season—killing or possession.....	1	40 00
Shore birds, close season—killing or possession; offering for sale	15	215 00
Quail, close season—killing or possession; excess bag limit, trapping without permit, shipping in concealed package.....	5	175 00
Cottontails, close season—killing or possession.....	2	50 00
Total game violations.....	159	\$3,675 00
<i>Fish.</i>		
Angling without a license.....	7	\$125 00
Fishing for profit without a license.....	18	175 00
Striped bass—underweight	5	145 00
Dried California shrimp in possession.....	1	-----
Illegal fishing apparatus.....	9	20 00
Spot-fin croakers, buying and selling.....	2	40 00
Trout, excess limit, undersized offered for sale.....	3	25 00
Catfish, undersized offered for sale.....	1	12 00
Young of fish, taking or possession.....	3	20 00
Crabs, close season—taking or possession.....	4	25 00
Clams, undersize	1	25 00
Abalones, undersize	3	40 00
Lobsters, undersize and oversize.....	5	90 00
Taking fish within 50 feet of fishway.....	1	-----
Total fish violations.....	63	\$742 00
Grand total fish and game violations.....	222	\$4,417 00

SEIZURES—FISH, GAME AND ILLEGALLY USED FISHING APPARATUS.

September 1, 1916, to November 30, 1916.

<i>Game.</i>		
Deer meat	333½	pounds
Hides	9	
Ducks	4,278	
Geese	1,158	
Quail	173	
Doves	8	
Shore birds	6	
Nongame birds	5	
Rabbits	26	
<i>Fish.</i>		
Striped bass	525½	pounds
Trout	48½	pounds
Dried California shrimp	4,160	pounds
Spot-fin croakers	1,435	pounds
Crabs	632	
Clams	100	
Lobsters	55	
Abalones	33	
Miscellaneous fish	8½	pounds
Illegal nets	10	
<i>Searches.</i>		
Illegal fish and game.....	111	

STATEMENT OF EXPENDITURES FOR THE MONTHS OF JULY, AUGUST AND SEPTEMBER, 1916.

General administration	July	August	September
General Administration—			
General administration	\$1,884 44	\$2,111 26	\$2,398 78
Research, publicity and education	194 70	376 71	219 59
Printing	178 01	731 73	379 47
Fish exhibits	219 10	235 00	679 21
Game exhibits		12 90	165 11
Game farm	279 36	385 31	199 02
Mountain lion bounties	180 00	320 00	280 00
Lithographing hunting licenses		21 00	
Lithographing anglers' licenses			7 50
Hunting license commissions and refunds	1,101 80	522 00	2,451 00
Angler's license commissions and refunds	1,631 70	348 20	1,028 90
Market fishing license commissions and refds.	33 50	59 00	23 50
	\$5,702 61	\$5,123 11	\$7,832 08
Patrol—			
San Francisco District	\$5,558 33	\$5,739 59	\$5,718 82
Sacramento District	4,611 98	4,098 96	3,652 76
Los Angeles District	1,867 80	1,870 40	2,113 86
Launch patrol	817 35	824 67	980 01
Prosecutions—fish and game	129 47	93 80	71 70
Crawfish inspection	100 00	100 00	100 00
Winter game feeding			
Accident and death claims		7 00	
	\$13,084 93	\$12,734 42	\$12,637 15
Department of Fish-culture—			
Hatchery administration	\$919 27	\$799 50	\$785 76
Mount Shasta Hatchery	2,407 03	2,375 70	3,253 72
Mount Shasta Auxiliary Stations			29 05
Mount Whitney Hatchery	1,110 11	283 67	224 01
Mount Whitney Auxiliary Stations	186 85	503 27	643 50
Tahoe Hatcheries	374 74	396 19	256 16
Tahoe Hatcheries Auxiliary Stations			
Marlett-Carson Hatchery	31 40	52 73	9 20
Fort Seward Hatchery	490 96	520 33	474 52
Ukiah Hatchery	175 43		
Snow Mountain Station		26 69	99 40
Brookdale Hatchery	249 21	25 39	
Scotts Creek Station	31 00	31 00	30 00
Almanor Station	149 74	167 77	805 24
Bear Valley Hatchery	177 75	250 00	69 87
Yuba City Shad Station		986 35	5 00
Fish distribution	2,916 90	1,410 38	1,431 54
Fish transplanting	182 19	397 10	229 50
Screen, fishway, water pollution	654 88	610 82	536 75
	\$10,057 46	\$8,836 89	\$8,883 22
Commercial Fisheries, Research and Patrol—			
Fishery research and patrol	\$509 63	\$433 75	\$378 92
Grand totals	\$29,354 63	\$27,128 17	\$29,731 37

PATROL SERVICE.

SAN FRANCISCO DIVISION.

E. L. Bosqui, Commissioner in Charge. Carl Westerfeld, Executive Officer.

J. S. Hunter, Assistant Executive Officer. E. C. Boucher, Special Agent.

Head Office, New Call Building, San Francisco.

Phone Sutter 6100.

W. H. Armstrong	Vallejo	H. H. Hunt	San Francisco
Earl P. Barnes	Eureka	R. S. Kimball	Merced
Theo. M. Benson	Fortuna	I. L. Koppel	San Jose
Edward Boyle	San Francisco	Henry Lencioni	Santa Rosa
O. P. Brownlow	Porterville	Tipton Mathews	Coalinga
F. A. Bullard	Dunlap	B. H. Miller	Ukiah
J. L. Bundock	Oakland	W. J. Moore	Napa
J. Burke	Colma	J. E. Newsome	Newman
M. S. Clark	San Francisco	P. H. Oyer	Pacific Grove
Earle Downing	Pleasanton	Chas. R. Perkins	Fort Bragg
S. L. N. Ellis	Fresno	H. S. Prescott	Crescent City
J. W. Gallaway	San Francisco	Frank Shook	Salinas City
Geo. F. Grant	Columbia	E. W. Smalley	Hanford
J. H. Hellard	Laytonville	Paul Smith	Guerneville
J. H. Hill	Watsonville	H. E. Foster	Launch "Quinnat," Vallejo
D. H. Hoen	San Rafael	Chas. Bouton	Launch "Quinnat," Vallejo

SACRAMENTO DIVISION.

F. M. Newbert, Commissioner in Charge.

Geo. Neale, Assistant.

Forum Building, Sacramento.

Phone Main 4300.

T. W. Birmingham	Red Bluff	F. S. Parke	Sutter Creek
C. H. Blemer	Sacramento	E. D. Ricketts	Live Oak
Frank P. Cady	Susanville	D. E. Roberts	Murphys
S. J. Carpenter	Maxwell	J. Sanders	Truckee
Geo. W. Courtright	Canby	C. A. Scroggs	Loomis
Euell Gray	Placerville	R. L. Sinkey	Woodland
W. J. Green	Sacramento	L. A. Streuber	Dana
J. W. Harris	Greenview	L. J. Warren	Taylorville
G. O. Laws	Weaverville	J. S. White	Castella
R. C. O'Connor	Grass Valley		

LOS ANGELES DIVISION.

M. J. Connell, Commissioner in Charge.

H. I. Pritchard, Assistant. Edwin L. Hedderly, Assistant.

Union League Building, Los Angeles.

Phones: Broadway 1155; Home, F 5705.

H. J. Abels	Santa Maria	A. T. Norton	San Diego
J. J. Barnett	Ventura	E. H. Ober	Big Pine
C. S. Bauder	San Luis Obispo	W. K. Robinson (on furlough)	El Toro
H. D. Becker	Los Angeles	A. J. Stout	Bakersfield
J. H. Gyger	Elsinore	Webb Toms	San Diego
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